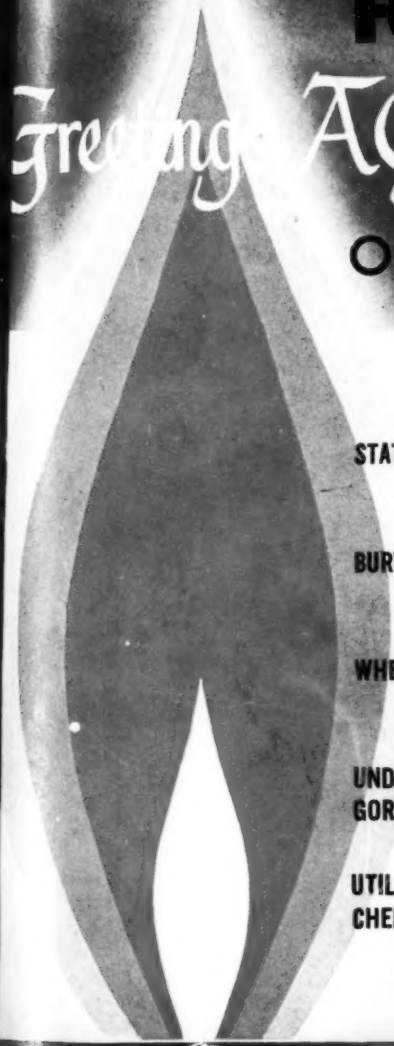
PUBLIC UTILITIES

FORTNIGHTLY

Greetings AGA Convention

OCTOBER 9, 1947



STATE REGULATION IN GAS CONSERVATION
Ernest O. Thompson

BURYING GAS IN MICHIGAN
Don E. Ha[illegible] and Don McGowan

WHERE IS THE FPC HEADING IN GAS REGULATION?
Samuel H. Crosby

UNDERGROUND GASIFICATION OF COAL AT GORGAS
Milton H. Fies

UTILIZATION OF NATURAL GAS IN THE CHEMICAL FIELD
Ralph S. Child

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PUBLIC UTILITIES REPORTS, INC., PUBLISHERS

Greetings

to the Delegates and Guests

attending the

American Gas Association Convention

Cleveland, Ohio

October 6-8, 1947

from the

Southern Natural Gas Company

Watts Building

Birmingham, Alabama

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Public Utilities Fortnightly

VOLUME XL — *October 9, 1947* — NUMBER 8

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¶ *This magazine is an open forum for the free expression of opinion concerning public utility regulation and allied topics. It is supported by subscription and advertising revenue; it is not the mouthpiece of any group or faction; it is not under the editorial supervision of, nor does it bear the endorsement of, any organization or association. The editors do not assume responsibility for the opinions expressed by its contributors.*

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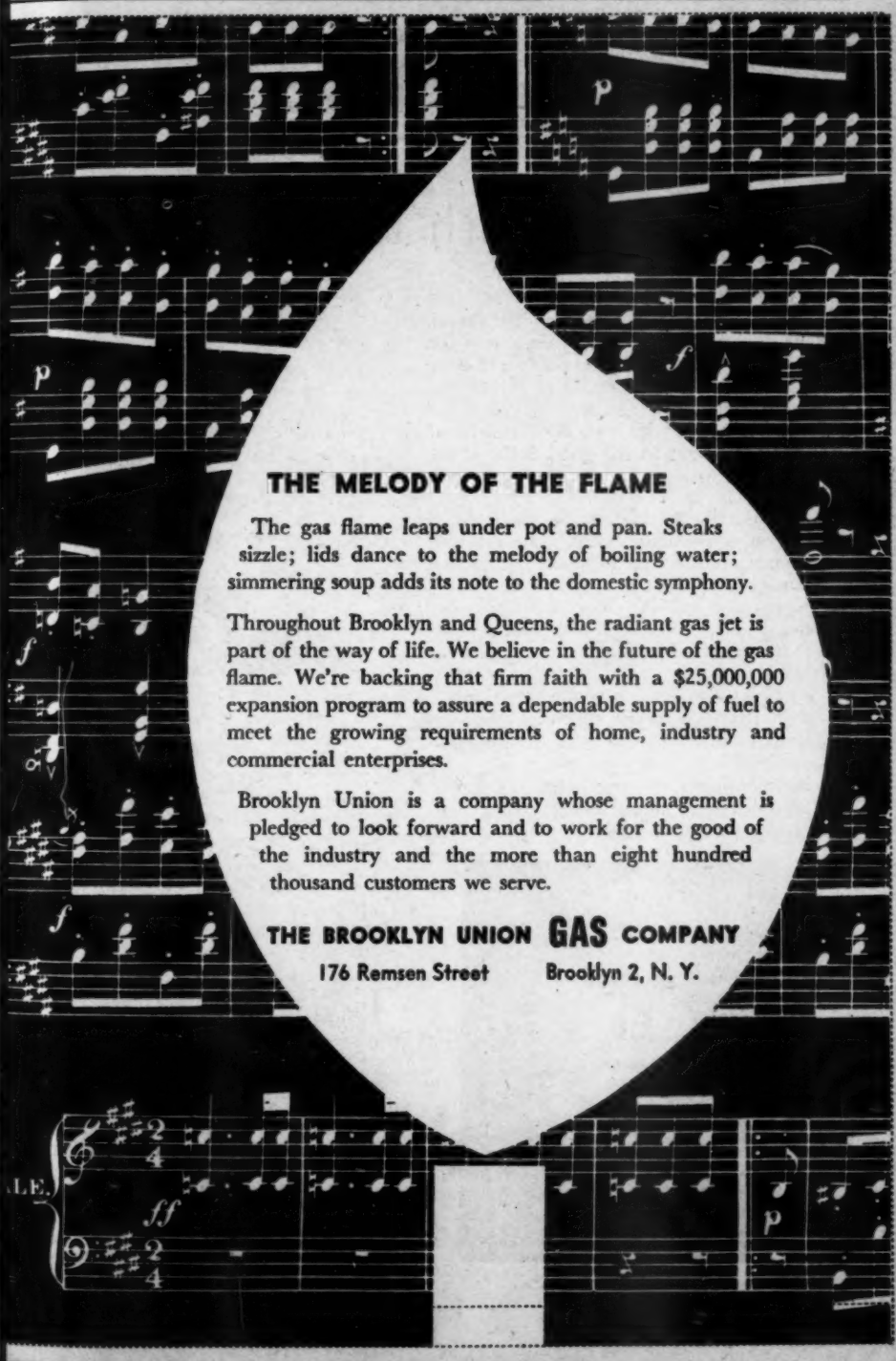
THE MELODY OF THE FLAME
The gas flame leaps under pot and pan. Steaks sizzle; lids dance to the melody of boiling water; simmering soup adds its note to the domestic symphony.
Throughout Brooklyn and Queens, the radiant gas jet is part of the way of life. We believe in the future of the gas flame. We're backing that firm faith with a $25,000,000 expansion program to assure a dependable supply of fuel to meet the growing requirements of home, industry and commercial enterprises.
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Pages with the Editors

As this issue of PUBLIC UTILITIES FORTNIGHTLY is being distributed, the American Gas Association meets for its twenty-ninth annual convention in Cleveland, Ohio. Accordingly, we salute this event with featured articles and other material which we hope will be of special interest to the good folks in the gas business.

IT is trite to say that gas has come a long way since the AGA came into existence. Yet, if someone had predicted twenty-nine years ago, when the United States was still busy concluding its participation in World War I, that the gas industry would, nearly three decades later, face a prospect of almost unlimited expansion, such a prophecy certainly would have been put down as more optimistic than realistic. At that time, it was obvious that what remained of the illumination business would soon be taken over by the growing young giant of electric power. Appliance dealers and manufacturers likewise foresaw, in the years following World War I, a lively rivalry between the two utility industries in the field of cooking, hot water heating, and so forth. The limited extent of natural gas production and pipeline facilities, as well as the high operating cost of manufactured gas, also seemed to foreclose the space-heating market except in certain favored localities.

ERNEST O. THOMPSON

MILTON H. FIES

TODAY the gas industry has not only held its own but is laying careful plans to expand indefinitely. The construction during World War II of the Big and Little Inch pipe lines—which, incidentally, have been converted to natural gas transportation across more than half of the nation—was a dramatic high light. But the "Inch" lines will soon be eclipsed by construction of more and bigger lines for the transportation of natural gas to large city areas which three decades ago would never have dreamed of such supply.

WE'RE ROLLING UP OUR SLEEVES...
TO HELP YOU!

need now to worry about the headaches of nging over to a new type of gas service... today your change-over problem can be ced in the hands of a skilled engineering anization whose specialists are expert in ry phase and detail of your conversion blem.

Now, one complete service, backed by years practical experience in handling difficult nge-over situations, can handle your entire nge-over...physical and sales potential sur-s... engineering and construction changes distribution and meter problems... appli-e and equipment adjustments. Every de- of complete or partial conversion is care-fully planned, supervised and executed by skilled personnel to insure satisfactory results... and customer acceptance.

This new change-over service gives valuable flexibility to utility companies who must supply today's growing demand for gas while preparing for tomorrow's needs.

Cost comparisons and operating experience show that placing the conversion problem in experienced hands can materially lower change-over costs through on-the-job economies learned from handling similar jobs... saving weeks of detailed planning at the start, thus protecting valued customer relations.

Centralize responsibility in expert hands.

If your company plans include surveys or conversions, write today for complete details.

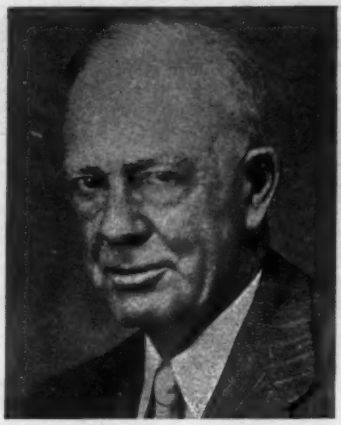
AGC

MORE than that, the magic of modern chemistry promises to make gas the medium of fuel conversion from other primary fuel sources, when the present sources of natural gas have been depleted from the standpoint of economic production—should that day, indeed, ever arrive. Perhaps the most spectacular experiment along this line was the recently conducted effort to change coal to gas while still under the ground, through controlled explosion and firing.

ONE of the principal engineers engaged in this experiment at the Gorgas coal mine of the Alabama Power Company is the author of the authoritative article on underground gasification of coal, which begins on page 486. This author, DR. MILTON H. FIES, was born in Birmingham and received his degree of Engineer of Mines at the School of Mines, Columbia University, New York. He was awarded an honorary degree of Doctor of Science from the University of Alabama in 1936. DR. FIES is a consulting engineer and is manager of coal operations of the Alabama Power Company. He has long been an active member in numerous professional associations dealing with engineering and mining, as well as educational institutions in the same field. He was at one time director of the American Institute of Mining and Metallurgical Engineers.

* * * *

ANY discussion of the expansion of natural gas must necessarily take into account the requirements of conservation in dealing with this irreplaceable natural resource. A pioneer and present leading figure in this movement is the veteran member of the Texas Railroad Commission and one-time chairman of the Interstate Oil Compact Commission, ERNEST O. THOMPSON, whose article on state commission regulation and gas conservation opens this issue. COMMISSIONER THOMPSON was born at Alvord, Wise county, Texas, fifty-five years ago. At an early age his family moved to Amarillo where he began an Horatio Alger series of juvenile business enterprises — newsboy, candy butcher, drug clerk, etc., which helped him through school. He attended the Virginia Military Institute and Eastman



SAMUEL H. CROSBY

Business College (Poughkeepsie, New York), and graduated ('17) from the University of Texas Law School as the president of his class.

HE served with the AEF in World War I and was promoted on the battlefields of France to the rank of Lieutenant Colonel at the age of twenty-six—the youngest officer of that rank in the whole AEF. After a period of private law practice in Amarillo, THOMPSON was elected mayor for two terms and in 1932 was appointed to the Texas Railroad Commission where he still serves.

* * * *

THE article entitled "Where Is the FPC Heading in Gas Regulation?" is written by SAMUEL H. CROSBY, who served for five years (1939-1944) as trial examiner for the Federal Power Commission. Since that time he has practiced as attorney in charge of the Washington office of E. Holley Poe & Associates, who organized the successful bid for the Big and Little Inch pipe-line properties. MR. CROSBY is a graduate of Grinnell College (AB, Phi Beta Kappa) with more than a quarter-century of diversified practice. He was an active participant in the recent special gas investigation of the FPC.

THE next number of this magazine will be out October 23rd.

The Editors

What are "Controllable Costs"?

Controllable costs are potential profits. They are dollars that could hit the happy side of the balance sheet except for waste and inefficiency.

"Controllable Costs" is also a very pertinent title for record systems grown old and antiquated.

For years, the Gas Industry's operating systems have been expedited by some of the finest record systems and accounting methods ever devised for public utilities. Working with Gas executives, Remington Rand — world's largest researcher and producer of business systems — designed the basic control methods that have touched almost every activity of the Gas Industry.

With these systems and methods went Remington Rand equipment...tabulating and calculating machines, typewriters, indexing systems, fire-resistant files and safes, bookkeeping machines, and Kardex, the signalled visible record system.

Together, the Gas Industry and Remington Rand provided methods that cut deep into the cancer of "uncontrolled" costs. Today, with the profit-spread squeezed to its minimum margin, we are again searching beneath the surface for the untapped profit resources found in Controllable Costs.

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Cost-cutting champions!

INTERNATIONAL DIESEL CRAWLERS

That's an International TD-14 Diesel Crawler in the scene above. It's leveling a rock-studded area for other equipment on the job. In the smaller scene an International TD-18 Diesel is doing a similar job at another location. Both are used to build roads and maintain them as well as clearing land. *Fast workers for little "wages", with long working lives.*

Costs tumble before these unbeatable tractors when there's land-leveling, excavating or any other bulldozing work to do.

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Remarkable Remarks

"There never was in the world two opinions alike."
—MONTAIGNE

J. D. GILL
Director, Atlantic Refining Company.

"Economically, we are a great country. But who is to say that we cannot be immensely greater?"

PAUL G. HOFFMAN
President, Studebaker Corporation.

"It is healthy for people to be concerned about their future—dangerous for them to be fearful."

EDITORIAL STATEMENT
The Wall Street Journal.

"The problem is to get the world onto its economic feet and do it without putting this country on its economic back."

GEORGE A. SLOAN
Chairman of the board, Southern Agriculturist.

"A cardinal characteristic of free economies has always been that men have a profit incentive to vie for the rewards of their productivity."

GEORGE E. WHITWELL
Vice president, Philadelphia Electric Company.

"If we have that [greater productivity] and free competition, we should reach a solution to our over-all economic problem provided we don't tamper with the machinery."

BENJAMIN F. FAIRLESS
President, United States Steel Corporation.

"We are, all of us, interested in doing our best, in whatever walk of life we choose, with the hope that extra effort and intelligent planning will enhance our position, rather than lead to regimentation."

E. F. JEFFE
Vice president in charge of sales, Consolidated Edison Company of New York, Inc.

"Unless the free enterprise system emerges successfully from this war, we will, in fact, have lost the war. Surely, this must not occur because industry and labor lack interest, aggressiveness, daring, and outspoken leadership."

Excerpt from statement by U. S. Chamber of Commerce.

". . . the headlines for eight months, in varying shades of pessimism, have cried recession and depression. Some of the forecasts have come from sources seeking to steer public opinion toward a revival of Federal deficit spending and public works."

ELLIOTT TAYLOR
Gas industry editor and writer.

"A natural gas company confronted with the necessity for making long-term contract commitments is expected these days not only to be guided by past decisions of the Supreme Court but also to guess at the future ones and congressional acts as well."

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EDITORIAL STATEMENT
Gas Age.

"The older we get, the more we become convinced that for cooking or any other use of heat, there's no fuel like an old fuel."

CHARLES EDISON
Former governor of New Jersey.

"If civilization is to survive, we must speed up our social sciences so that the products of the physical sciences will be used constructively instead of destructively."

M. P. CONNERY
Resident, Providence, Rhode Island.

"Government-guaranteed interest can be no part of Socialism, neither can it be any part of free enterprise; it can only be totalitarian, and it represents the real exploitation of the workers."

JOSEPH H. BALL
U. S. Senator from Minnesota.

"There is a 'substantial political group in this country urging us to kill the goose that lays the golden eggs by traveling down the same socialistic path of stagnation, privation, and dictation.'"

MAX BALL
Director, oil and gas division, Interior Department.

"Including all sources of synthetic fuels, we can beyond question fill all our (petroleum) needs in the foreseeable future over a very, very long period of time, and I am speaking now of hundreds of years."

A. M. SULLIVAN
Associate editor, Dun's Review.

"Life is an adventure and we are called upon to share its dangers and rewards, but the wise man takes the calculated risk with his eyes wide open—and doesn't accept the blind gamble in which he is at the mercy of luck."

MELCHOIR PALYI
Chicago economist.

"If fear of depression could create the thing it fears, we certainly should be having a depression for a half year or so. This is what economic charlatans would bring about, if they could, so as to break the resistance against governmental management of the economic system and to reopen the dikes of public spending—which is what they are after."

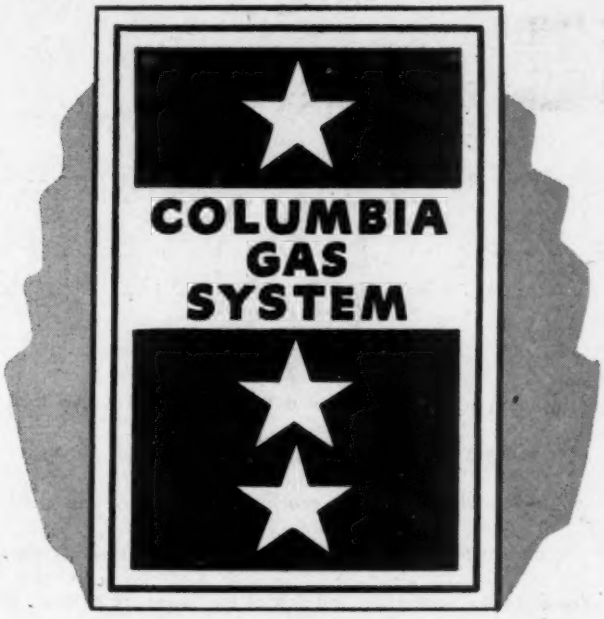
LEWIS W. DOUGLAS
United States Ambassador to Great Britain.

"There is no reason why countries with different economic systems may not work together effectively and successfully toward the reconstruction of one of the great devastated regions of the world; but they cannot hope to do so if uneasiness, suspicion, fear, and hatred are deliberately inspired among them and among the citizens of each."

FRANCIS L. WHITMARSH
President, National-American Wholesale Grocers' Association.

"The amount of loose talk about a depression that is being offered by substantial and successful businessmen is appalling. If a few more people would get down to fundamentals and begin to use a little more common sense, instead of trying to chart their way into a depression and then putting their efforts into a formula to get us out of it, I know the entire country would be far better off."

Symbol of Service



Columbia Gas System, operating more than 30,000 miles of gas transmission and distribution lines, serves nearly 1,000,000 homes, industries and commercial enterprises in New York, Pennsylvania, Ohio, Virginia, West Virginia and Kentucky. In addition, The System supplies gas at wholesale to other utilities including those serving Washington, D. C., Cincinnati and Dayton, Ohio and their territories.

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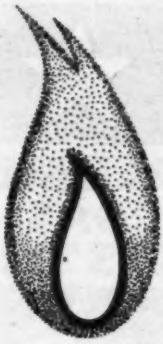
The Manufacturers Light and Heat Company **United Fuel Gas Company**

and other Operating Companies

Columbia Gas & Electric Corporation
(the parent company)

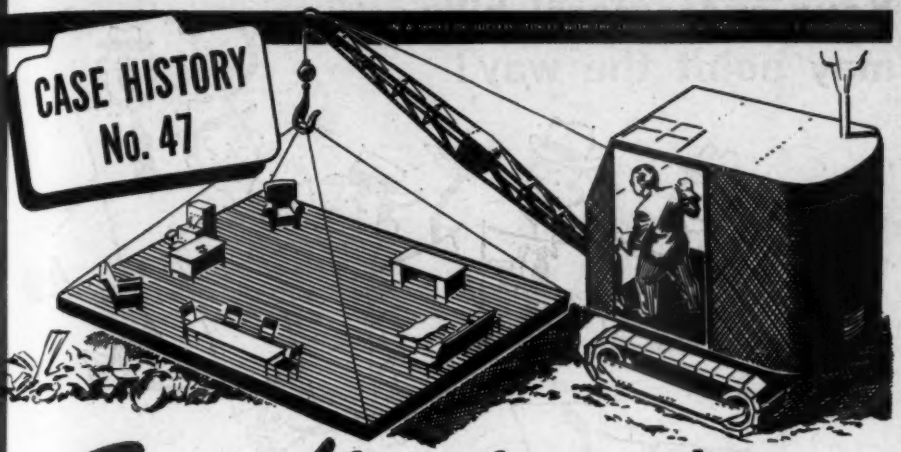
Columbia Engineering Corporation
(the service company)

The Heat's On!



Modern science has taken a tiny flame and turned it to cooking and refrigerating food, automatically drying freshly-laundered clothes, providing hot water, and heating and humidifying or cooling and filtering the air in the homes of the nation . . . all this at the lowest rates ever. Small wonder that we now find the heat's on, that we have to strike a very fine balance between customers' needs and available supplies. The fact is, there is an acute shortage of piping for installing Gas lines and, temporarily, demand for Gas is outweighing supply. But we are going ahead with plans for the future needs of the communities we serve in the Mid-West. Soon we hope the magic of Gas will be available to everyone.

The United Light and Railways Company



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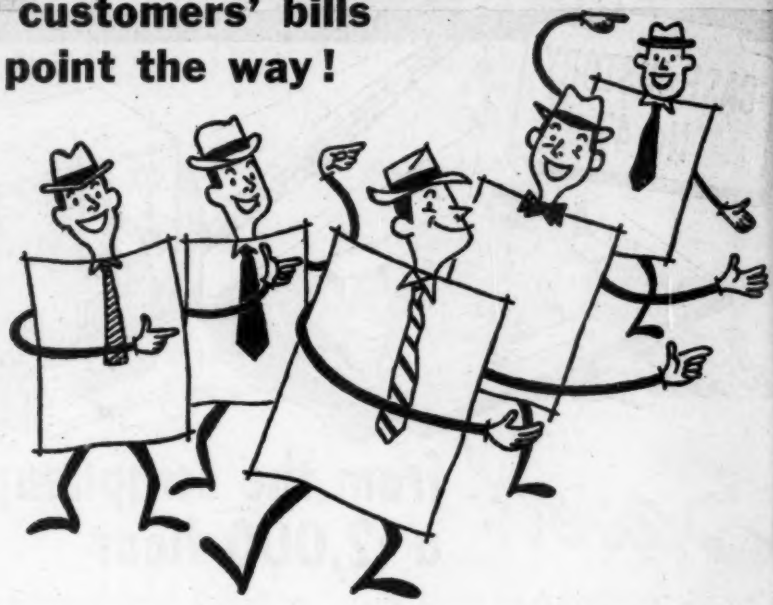

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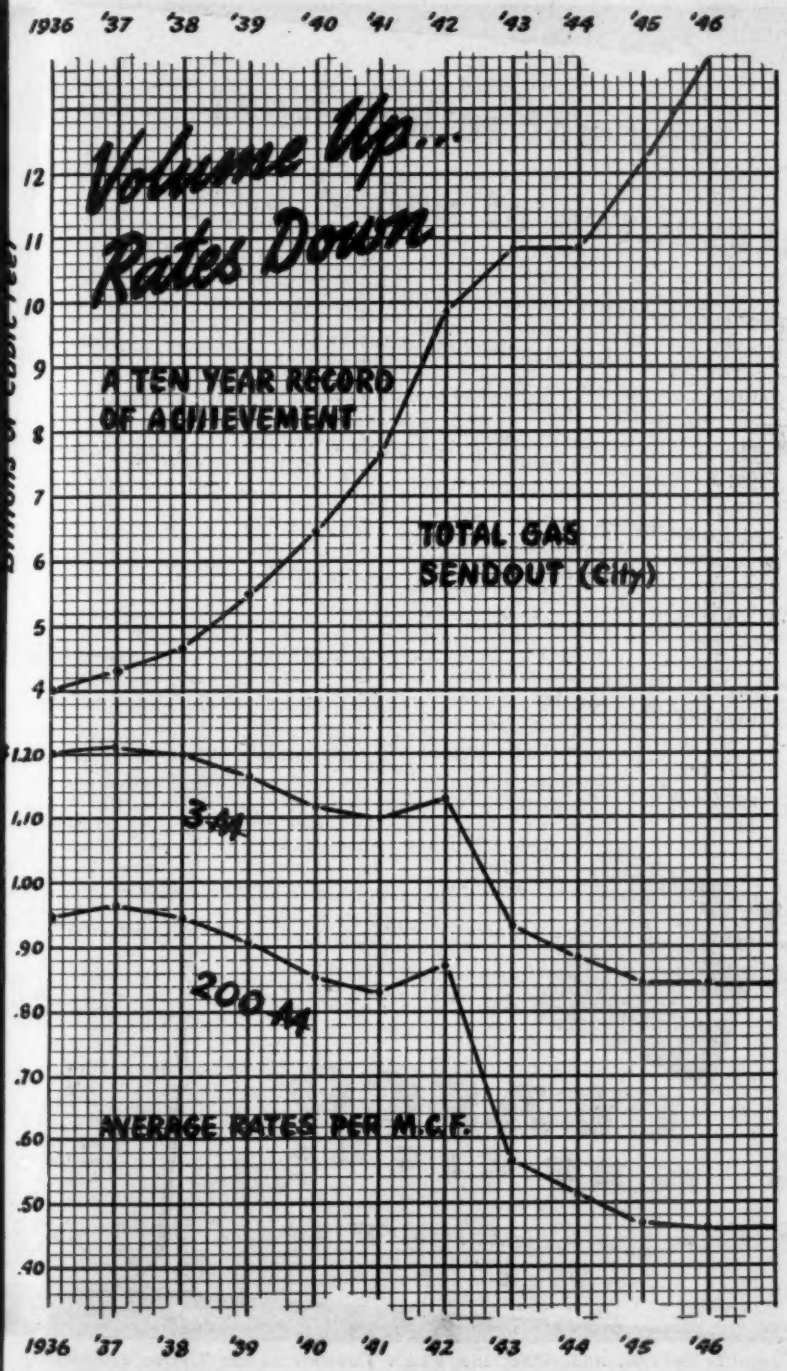

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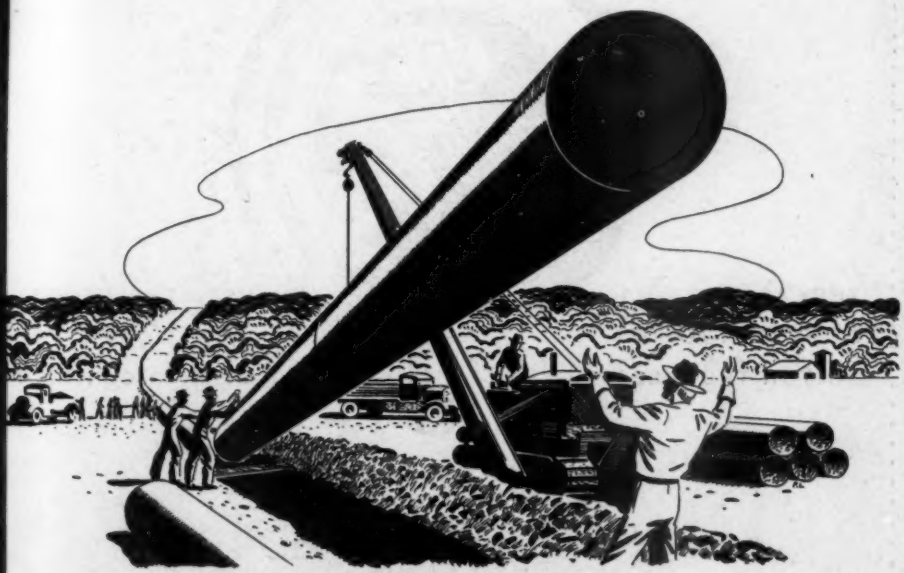

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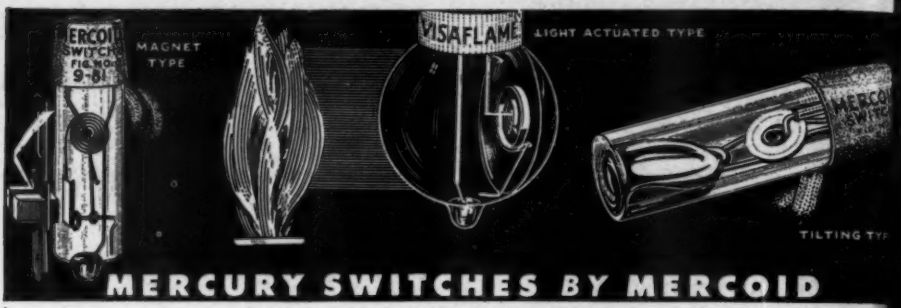
PACIFIC GAS AND ELECTRIC COMPANY



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GAS HAS GOT IT!

THE unprecedented demand for GAS throughout our rapidly growing Long Island territory demonstrates that GAS has what it takes for better living in this modern age.

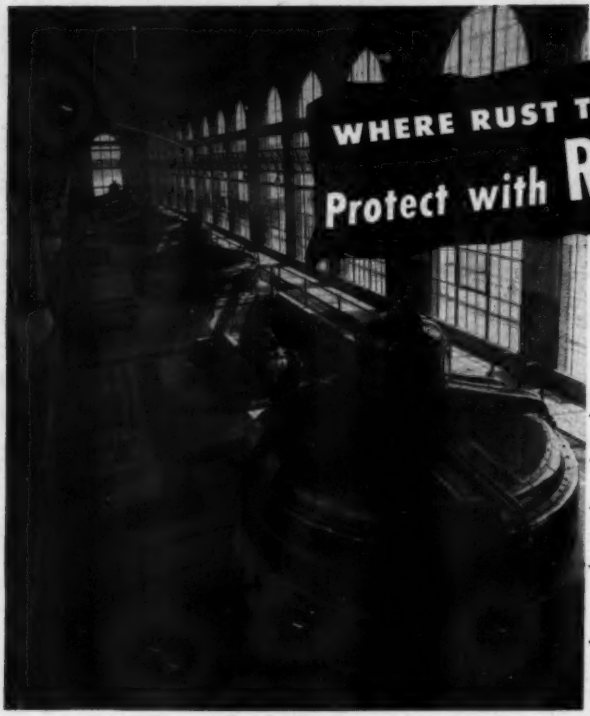
Little wonder that our gas plants are operating at a record rate while we are rushing to complete additional productive capacity in our effort to keep up with this greatly increased demand.

Among other steps we are taking is the construction of four new butane and propane plants, one of which is the new catalytic cracking type. An additional water gas plant has also been projected together with a large, new holder.

People appreciate the cleanliness, speed, and convenience of the magic blue flame—that's why new homemakers as well as old agree that "GAS has got it."

Long Island Lighting Company

Queens Borough Gas & Electric Company
Nassau and Suffolk Lighting Company



WHERE RUST THREATENS...

Protect with RUST-OLEUM

IT SAVES METAL..
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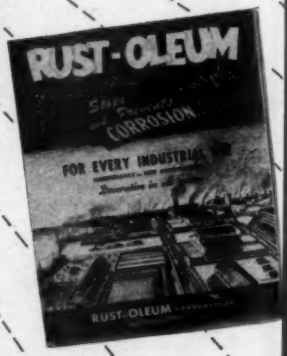
THIS *Free* BOOKLET TELLS HOW



RUST-OLEUM IS A POSITIVE RUST PREVENTIVE. Its enduring coating seals metal against the ravages or rain, snow, dampness, fumes and other destructive, rust-forming conditions. Public utilities save on maintenance costs by using Rust-Oleum. Tough, elastic weatherproof—it adds years of protection to all metal surfaces. RUST-OLEUM CAN BE APPLIED DIRECTLY OVER RUSTING METAL—by brush, dip or spray. *It outlasts ordinary protective materials two to ten times depending on conditions.*

Complete engineering service is available. Rust-Oleum stocks are carried by distributors in principal cities.

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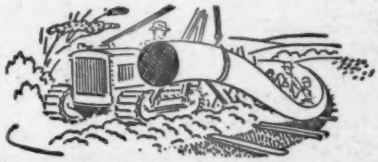
THE STORY OF NATURAL GAS IN OKLAHOMA!

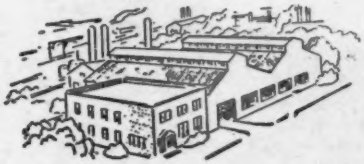
As Oklahoma has grown in population, so has it grown industrially and commercially. Step by step industry, commerce and Oklahoma have marched hand in hand through the last fifty years. Each has contributed to the other's growth, and one of the most interesting sidelights in their rapid progress is the part Natural Gas has played in this drama of development.

Back in 1896, Oklahoma's pioneer industries could be counted on the fingers of one hand. As markets expanded and the oil and gas industries developed, Oklahoma began to grow. Restaurants, cotton gins, brick plants, canning factories, and hundreds of commercial establishments mushroomed almost overnight.



As Oklahoma matured, the people became increasingly dependent upon good gas service. The demand for natural gas increased and our distribution problems became more and more complex. Additional pipe lines had to be laid and interconnected to carry this flexible, universal fuel throughout the state.

Today, Oklahoma offers industry and commerce even greater opportunities. Healthful climate, abundant resources of Natural Gas at lowest rates, skilled labor and capital, all combine to make Oklahoma one of the most attractive locations for new industry in the southwest.



Industrial users and domestic customers of natural gas alike have found it amazingly economical . . . especially when they consider the flexibility, speed and the efficiency natural gas affords industrial and manufacturing processes.

OKLAHOMA NATURAL
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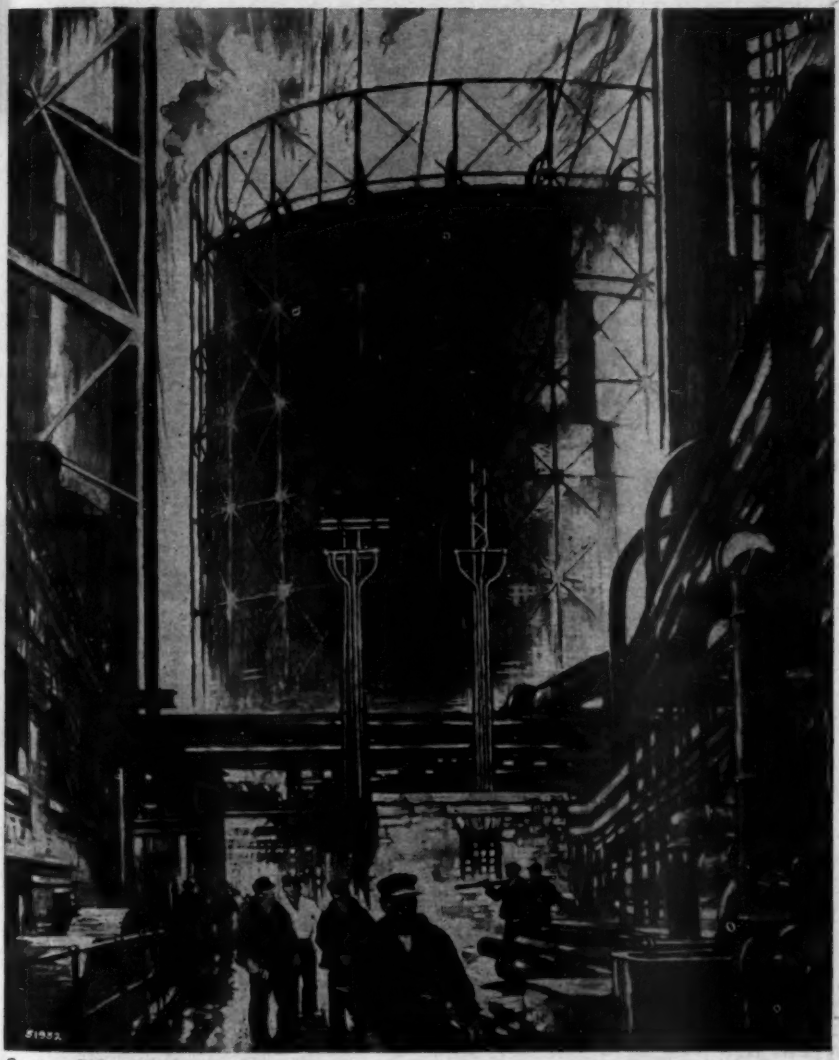

Courtesy, Philadelphia Electric Company

Down by the Gas Works

Copy of a water color painting by Thornton Oakley of the gas plant at West Conshohocken, Pennsylvania

Utilities Almanack

October

9	T^{h}	¶ *American Water Works Association, Iowa Section, begins meeting, Cedar Rapids, Iowa, 1947.*
10	F	¶ *Porcelain Enamel Institute begins annual meeting, Cleveland, Ohio, 1947.*
11	S^{a}	¶ *American Water Works Association, Missouri Section, will hold meeting, Jefferson City, Mo., Oct. 27, 28, 1947.*
12	S	¶ *National Reclamation Association will hold annual convention, Phoenix, Ariz., Oct. 29–31, 1947.*
13	M	¶ *American Water Works Association, Southwest Section, begins meeting, Amarillo, Tex., 1947.*
14	T^{u}	¶ *United States Independent Telephone Association begins annual convention, Chicago, Ill., 1947.*
15	W	¶ *Electrochemical Society begins fall congress, Boston, Mass., 1947.* ¶ *Virginia Independent Tele. Asso. will hold convention, Roanoke, Va., Oct. 30, 31, 1947.*
16	T^{h}	¶ *Pennsylvania Electric Association, Transmission and Distribution Committee, begins fall meeting, Ligonier, Pa., 1947.*
17	F	¶ *Missouri Valley Electric Asso. ends accounting conference, Kansas City, Mo., 1947.* ¶ *Florida Telephone Association will hold meeting, Orlando, Fla., Nov. 3, 4, 1947.*
18	S^{a}	¶ *American Institute of Electrical Engineers will hold Midwest general meeting, Chicago, Ill., Nov. 3–7, 1947.*
19	S	¶ *American Water Works Association, New Jersey Section, will hold meeting, Atlantic City, N. J., Nov. 6–8, 1947.*
20	M	¶ *National Metal Congress and Exposition begins meeting, Chicago, Ill., 1947.* ¶ *Georgia Telephone Association will hold convention, Atlanta, Ga., Nov. 10, 11, 1947.*
21	T^{u}	¶ *Association of American Railroads, Communications Section, begins convention, Miami Beach, Fla., 1947.*
22	W	¶ *Wisconsin Utilities Association will hold joint convention of Gas and Electric Sections, Commercial and Technical Divisions, Milwaukee, Wis., Nov. 19–21, 1947.*

Public Utilities
FORTNIGHTLY

VOL. XL, No. 8 OCTOBER 9, 1947

State Regulation in Gas Conservation

A description of the steps taken by the Texas Railroad Commission to end the wastage of flare gas through desirable and profitable utilization.

BY ERNEST O. THOMPSON*
CHAIRMAN, TEXAS RAILROAD COMMISSION

FLARE gas is like the weather in that everybody is talking about it, but different from the weather in that something is really being done about it.

Oil and gas conservation has come a long way since the days when a gas well was allowed to blow its head off in the hope that it would blow into an oil well.

I well remember back in 1919 at Amarillo when Texas folks got together 60,000 acres of oil and gas leases to induce someone to bore for oil.

Hapgood No. 1 came in a gasser and everyone was disgusted and disappointed. We were looking for oil. Finally, it was proposed that this natural gas be brought to town for light and fuel and there was the biggest fight you ever saw over the idea of such a thing. Our artificial gas plant people said this natural gas would blow everything up and, besides, it would be injurious to the health of the people of Amarillo.

Our people finally became reconciled when real oil was discovered and we

*For personal note, see "Pages with the Editors."

had flares burning from hundreds of wells showing that at last we were an oil-producing country.

No one thought of the value of flare gas.

Billions upon billions of feet of gas were flared in the Panhandle field. Then, finally, we got our chamber of commerce busy looking for industries to come and fill our prairies with smokestacks, using our gas for fuel. We sent our emissaries all over the United States trying to get industries to move to Amarillo to take advantage of our clean, cheap fuel. But none was interested.

We spent $60,000 advertising this abundance of gas in the world's largest gas field. We even offered gas free for five years to any industry that would come to Amarillo and employ fifty or more people. None came even for free gas.

Therefore, we decided that if the industries would not come to the gas we would help pipe the gas to them. That was a success.

We had much gas in wells with no one to buy it; so who was there to bother about a little flare gas from oil wells that brought in the money and made things boom.

GAS never brought any boom. No one ever heard of a gas boom town, although Carthage, Texas, comes the nearest ever to being such a town.

Now, however, since we have learned what makes oil fields tick; now that we have learned about reservoir pressures and how to practice control of reservoir energy; now that a vast number of people have learned the comfort and convenience of this clean, efficient fuel known as natural gas, and everybody is talking about flare gas and wanting something done about this terrible waste of this great natural resource, something is being done about it!

Conservation efforts by state regulatory authorities can go no faster than public opinion will support. Even *health* measures can be effectively enforced only when so backed. Remember what a howl went up over the land about vaccination for smallpox? Remember what a fight we had in America to get meat inspection? Remember how hard the fight was to sell soil conservation to the very people whose lands were being slowly eroded by wind and water? But, when once aroused, public opinion is the greatest driving force on earth.

Flare gas has always seemed a waste product to persons unfamiliar with oil production. Now even the people in the oil country are getting hot under the collar about the flaring of gas into the air. People in Texas are determined that something must be done about it, and soon.

We have long had the necessary laws to prevent gas waste from oil wells, but only now has public opinion become sufficiently enlightened to be a force strong enough to support conservation of flare gas.

THE public now knows that in some fields this gas can be collected, the liquid hydrocarbons recovered, and the dry gas then compressed sufficiently to return it to the oil-producing reservoir; there to maintain the reservoir pressure and furnish the energy to lift more oil to the earth's surface.

Then the public also knows that maintenance of reservoir pressure is

necessary in some wet gas fields in order to prevent retrograde condensation by keeping the heavier fractions in suspension so that these valuable light hydrocarbons may be successfully recovered for use.

Therefore Texans are doing something about flare gas.

The war effort made it almost impossible to get the necessary materials and equipment for this expensive conservation effort; but this made our people all the more conservation conscious. With the war behind us, Texans started at full tilt to get more complete utilization of flare gas.

The gas industry holds the key to complete achievement of the goal public opinion has set. The fruits of conservation must be given first place in the market for gas and the liquid hydrocarbons recovered in this conservation-for-use effort. Market outlets must be had for this great quantity of casing-head oil well gas. The gas industry has the pipe lines and the markets. With its help our efforts can be successful to the profit and benefit of producers and consumers alike.

IT is notable that the daily average production of oil in Texas for the year 1939 was 1,305,617 and that the daily average production in barrels of oil for the state of Texas nearly doubled for the year 1946 to an average of 2,070,959 barrels. This, while in 1939 the daily average casing-head gas production as an incident to the oil production was 1,730,000,000 cubic feet of gas per day. During the year 1946 the daily average casing-head gas production in the state of Texas was 2,744,000,000 cubic feet of gas, showing that the casing-head gas production is incident to the oil production; as oil is increased the casing-head gas production is increased, and it almost doubled that of 1939. At the same time the daily average casing-head gas *utilized* in the year 1939 was 768,000,000 cubic feet of gas per day, while during the year 1946, we had increased our utilization of casing-head gas to 1,555,000,000 cubic feet of gas daily, which was *almost 100 per cent increase in conservation* of this natural resource, which is an incident to the oil production.

As of April 10, 1947, the last figures available, as a result of all commission hearings, showed that 15 plants for extraction and compression have already been completed in Texas at a cost of $11,427,000. They will conserve 101,000,000 cubic feet of gas per day. At the same time, 10 plants are now under construction at a cost of $40,813,000 that will be in operation either by the end of 1947 or the middle of 1948. They will conserve 174,000,000 cubic feet of gas per day. Forty-four projects

¶ "EXPERIENCE *has shown that as the price of natural gasolines and distillates increases, the propanes and butanes will become more and more valuable. So a number of Texas companies now gather butanes and propanes, which have for years been flared. The saving and utilization of the liquid hydrocarbons which started in Texas from zero are now in excess of 200,000 barrels per day.*"

are now being planned at a cost of $75,090,000, and will be in operation in the early part of 1949 or the middle of 1949. They will conserve 485,000,000 cubic feet of gas per day. This will make a total of 69 plants either completed, now building, or planned. The total cost of these projects will be $127,330,000, and the total gas conserved 760,000,000 cubic feet per day. Of this amount, it is estimated that 452,000,000 cubic feet per day will be available for pipe-line transportation, and 308,000,000 cubic feet put back to maintain pressure and lift additional oil.

In addition to those 15 new projects now completed, since 1939 and up to February, 1947, 36 gasoline and repressuring plants have been put in operation. As of February, 1947, these plants processed a daily volume of 374,000,000 cubic feet of gas; and daily flared 47,800,000 cubic feet, after processing. The total casing-head gas utilized from these 36 plants is 326,000,000 cubic feet per day, all of which shows that the operators and the Texas commission have been working at this conservation program since 1937 in as vigorous fashion as was possible.

When the plants or projects now on paper and in process of construction are completed, only 18.4 per cent of the total casing-head gas produced in Texas will be flared, indicating a utilization in the neighborhood of 81.6 per cent. This is excellent progress in spite of war emergency needs for materials, since flared gas at present is in the neighborhood of 24.9 per cent. In Texas, regrettably, 1,153,000,000 cubic feet of casing-head gas, gas produced with oil, is now being flared. When all of the existing plants or planned projects are completed, only 514,000,000 cubic feet will be wasted and this amount will be from isolated fields where, at the present price of gas, it is not economically feasible to require gathering and processing. Naturally, as the price of gas increases and the price of liquid hydrocarbons stabilizes, the economic limits will be extended and more and more gas will be utilized. In this conservation effort, the Texas commission is getting unstinted support from the general public, from the landowners, and from the operators.

The gross production and disposition of the casing-head gas and dry gas in Texas in 1946 were roughly 2 trillion, 768 billion, 938 million, 762 thousand cubic feet. Of that total, 40.2 per cent went into pipe lines for light and fuel and only 3.92 per cent was flared. Texas exported 40.14 per cent of its natural gas. The pipe-line use was 59.86 per cent.

Experience has shown that as the price of natural gasolines and distillates increases, the propanes and butanes will become more and more valuable. So a number of Texas companies now gather butanes and propanes, which have for years been flared.

The saving and utilization of the liquid hydrocarbons which started in Texas from zero are now in excess of 200,000 barrels per day. This is in excess of the total crude oil produced by many oil-producing states.

Belief in and practice of true conservation is a mark and goal of good citizenship. Hundreds of millions of barrels of petroleum and petroleum products were consumed by the war effort. That was necessary. We drove

Quest for Natural Gas

"If a fair price could be had for natural gas and extracted liquid hydrocarbons gas, people would be looking for gas fields as they now search for oil. In the past the quest has been for oil. Many times the wildcatter's hopes were shattered when he merely struck gas. It was looked upon as a total loss. Often the well would be plugged and abandoned for lack of a market at any price."

to a great and glorious victory on the ocean, in the air, and on land by petroleum-propelled vehicles—ships, planes, and tanks. But the use of hundreds of millions of barrels of our oil for war forcefully emphasizes the necessity for even greater and more complete conservation efforts.

PRESENT consumption of oil and gas is beyond all forecasts of the expert economists. The refining capacity of the nation was taxed to meet the summer's demand. Everybody is motoring somewhere and going further than ever. The pent-up vacation desire of the war period had a full expression this year. By the same token, the people of America have become keenly conscious of the great benefits and comfort that can come from the use of the clean, convenient fuel called natural gas. Pipe lines are being built and projected to reach almost every part of the country, some going to California, the Middle West, and the eastern portions of the United States.

Natural gas is coming into its own.

The gas industry will be called upon to transport and distribute this great blessing of nature. It is only fair to say that the producers are entitled to a fair price for gas at the well; and the price to the consumer must be fair, cost, risk, and fair profit being given due consideration.

It is our intention in Texas to give conservation first place in the demand picture. Liquid hydrocarbon extracted from casing-head gas produced with oil must be used by the refiners of our nation. The Texas Railroad Commission will give them first place in the allocation to meet market demand for petroleum. After this gas has been processed and the liquid hydrocarbons removed, this residue gas will be allocated to first place in the market de-

mand for natural gas. The remainder of the market demand will be filled from dry gas wells which can be prorated for that purpose. The reason for this is that this natural gas must be used. In certain fields the prime need is to return the gas to the reservoir to maintain pressures and to lift more oil, but where that is not feasible or economical it would be folly to flare it.

THE latest figures on estimated recoverable gas reserves in the United States is 151 trillion, 260 billion cubic feet. Of this amount Texas has 85 trillion, 480 billion cubic feet. The March 27, 1947, issue of the *Oil and Gas Journal* gives the total liquid hydrocarbons of the nation as follows: Condensate only, 1 billion, 50 million, 794 thousand barrels; other natural gas liquids, 2 billion, 270 million, 233 thousand, which, added to our crude oil reserves of the United States of 20 billion, 873 million, 560 thousand barrels, makes a grand total of liquid hydrocarbon reserves in the United States of 24 billion, 194 million, 587 thousand barrels. This is the first time in the history of oil statistics that full notice has been given to the sizable amount of liquid hydrocarbons contained in the gas of this country, both casing-head and condensate. It shows the magnitude and importance of this reserve to our future economy.

At present the average price of crude oil at the well in Texas is around $1.80 per barrel. There is the same British thermal heat unit content in 6,000 cubic feet of gas as in a barrel of oil. If we will, therefore, divide $1.80, the price of a barrel of oil, by six, we find that 30 cents would be the comparable value in heat unit content to 1,000 cubic feet of gas.

True conservation can be served better by having a fair competitive price in the field for natural gas; in other words, if gas were sold for what it is worth, many operators would conserve and save reserves that have been plugged and abandoned for lack of market. If a fair price could be had for natural gas and extracted liquid hydrocarbons gas, people would be looking for gas fields as they now search for oil. In the past the quest has been for oil. Many times the wildcatter's hopes were shattered when he merely struck gas. It was looked upon as a total loss. Often the well would be plugged and abandoned for lack of a market at any price. We know better now.

"IT would be a major mistake to assume that there is an automatic relationship between the stock market and business under today's highly abnormal conditions. The large volume of accumulated savings by individuals, large liquid assets by industry, and tremendous shortages assure a market for the products of industry, and hence large-scale production, unless strikes cut off supply or effective demand, is adversely affected because of the price rise which might result from unreasonable wage increases."

—EDITORIAL STATEMENT,
The New York Times.

Burying Gas in Michigan

Use of underground storage to enable the public to have an adequate quantity at all times at reasonable cost with the assurance of a long-time supply.

By DON E. HERRINGSHAW and DON McGOWAN*

MICHIGAN'S appetite for natural gas had grown beyond the supply. There was not enough to go around. Soon, it was clear, there wouldn't be enough to begin to go around. The supply had to be not merely increased but multiplied.

Consumers Power Company, one of the two larger gas distributing companies operating in Michigan, found the solution of its part of the problem in an underground gas storage project. It was not a new idea. During the last few decades several other underground gas storage projects have been undertaken successfully in various parts of the country; but the Consumers project is unusual both in size and in scope. It may be the largest underground storage project ever undertaken; and it is designed to meet the natural needs of a large industrial area not for just a few years but for a quarter-century.

Consumers Power Company supplies natural gas service in 256 Michigan communities, including the cities of Bay City, Flint, Saginaw, Midland, Owosso, Pontiac, Royal Oak, Ferndale, Mt. Clemens, Jackson, Kalamazoo, Lansing, and Marshall. It has 261,000 gas customers, representing a population of several times that number. The area is highly industrialized; in it are located some of the largest plants of the General Motors Corporation, many factories making automobile parts, and one of the world's largest chemical companies.

At first only manufactured gas was available in the area. Discovery of natural gas in Michigan made it possible to "change over" Midland from manufactured to natural in 1931, Saginaw and Bay City in 1933, and Lansing in 1936; but there was not enough Michigan natural gas in sight to justify "changing over" the remainder of the Consumers area. So Consumers contracted with the Panhandle Eastern

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Pipe Line Company for a supply of natural gas from Texas and Kansas. This permitted the "changing over" of Flint, Owosso, Pontiac, Mt. Clemens, Royal Oak, Ferndale, Jackson, Marshall, Kalamazoo, and many smaller and neighboring communities during the earlier part of World War II.

THE contract with Panhandle had been made in the light of conditions existing before the United States got into the war. It called for enough Panhandle gas to meet the needs of the immediate future. In those days, it may be remembered, natural gas had to be *sold*. People did not write letters to the governor demanding the right to heat their homes with gas. (Why, there even was a time when gas conversion burners for installation in coal or oil furnaces had to be marketed on the free trial plan!) It was felt that the natural gas market would expand rather gradually, and that more southwestern gas could be contracted for later.

Then came the war. Use of gas in plants making materials for war multiplied in Michigan and in every industrial area where natural gas was available. Wartime restrictions were imposed on the construction of pipe lines.

Under these conditions Consumers could not obtain an increased supply of gas from the Southwest. It could not even obtain all the southwestern gas for which it had contracted prior to America's involvement in the war. Time and again, the southwestern gas that normally would have come to Consumers was diverted by government order to Detroit or Pittsburgh. This was a necessary wartime measure, but the effect on the company was serious. Instead of distributing seven parts of southwestern gas to three parts of Michigan gas, as planned, Consumers frequently had to carry practically its entire swollen load for days or weeks with gas from the Michigan fields.

THE result was that the Michigan fields became badly depleted. Their life was shortened by many years. The plain truth is that the Michigan fields were sacrificed for the war effort.

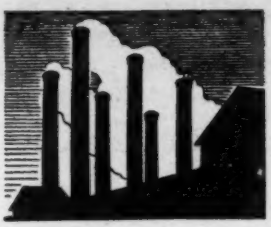
After the war ended and restrictions on the use of gas were removed, the use of natural gas for house-heating and other purposes began to expand so rapidly that Consumers, in order to safeguard already connected customers, had to ban all new industrial or house-heating installations.

Meanwhile, company officials were trying to hit on the best means of getting a lot more gas, for studies showed that the demand would continue to grow rapidly through the years. There seemed to be only three possibilities:

1. Discovery of important new gas fields in Michigan. Drilling history indicated that no dependence could be placed on this possibility.

2. Purchase of additional gas from Panhandle as needed. In the postwar situation, this proved impractical for several reasons. One of the more important was the poor load factor involved. Michigan is cold in winter, warm in summer. Pipe-line facilities sufficient to bring enough gas from the Southwest to meet the day-to-day needs of the Consumers area in winter would be used to only a minor fraction of capacity in summer. The year-around load factor would be only 45 per cent. That would make the gas expensive.

3. Development of areas in Michigan for the storage of natural gas. This would permit the pipe lines which



Consumers Power Company

"CONSUMERS POWER COMPANY supplies natural gas service in 256 Michigan communities, including the cities of Bay City, Flint, Saginaw, Midland, Owosso, Pontiac, Royal Oak, Ferndale, Mt. Clemens, Jackson, Kalamazoo, Lansing, and Marshall. It has 261,000 gas customers, representing a population of several times that number."

bring out-of-state gas into Michigan to be used at their full capacity throughout the year. In summer, they would bring in more gas than needed, and the excess would be stored for future use. In winter, they would bring in less gas than needed, and the deficit would be met with gas out of storage.

ALTERNATIVE No. 3 was the one adopted. It happened that two Michigan natural gas fields, the Winterfield and Cranberry lake fields, were well suited for use as storage fields. The two fields were close to each other and not too far away from the cities where the gas would be used. They were large enough to receive and eject 15,000,000,000 cubic feet of gas in one cycle; that is, every year. Through their use as storage fields, Consumers would be able to handle three times as much business annually as it could without them.

In a project of this kind, complete control of the storage area is essential. Consumers undertook to buy control of the Winterfield and Cranberry lake fields. This was a tedious process. The two fields underlie 44,000 acres. It was necessary to purchase the rights of thousands of persons. Working interest, over-riding royalties, and royalty interests all had to be bought. Even then the job was not finished. Actual ownership of the formation that was to be used for gas storage had to be purchased from the fee owners of the land. The state of Michigan owned 12,000 acres in the fields and was prevented by law from selling. A 99-year lease was worked out for this acreage.

The job of acquiring control of the fields took infinite patience and millions of dollars.

It was decided that owning and operating a gas storage field might be a little out of character for Consumers, a gas distributing company. So Consumers and Panhandle agreed to set up another company, the Michigan Gas Storage Company. This new company would own and operate the storage area. Panhandle would transmit gas from the Southwest and sell it to Michigan Gas Storage, which would store and transmit it to various city gates for distribution by Consumers.

THIS plan had several advantages, one of the more important being that a separate storage company could sell some of the stored gas to other public utilities in Michigan, such as those serving Adrian and Battle Creek—a type of business outside the scope of a "retailer" like Consumers.

Michigan Gas Storage is jointly owned by Consumers and Panhandle, with the former company owning a substantial majority of the stock. Panhandle's part ownership of the storage project naturally gives that company a more direct interest in the project's success. With such an arrangement, a contract extending over a period of twenty-five years and providing for increased deliveries of gas from year to year was negotiated.

Establishment of the storage company imposes no additional cost on the customer, for the storage company will receive only a fair return on money invested. So the cost of gas to Consumers Power Company will be substantially the same as if Consumers owned and operated all the storage and transmission facilities itself.

All phases of the whole project were reviewed by the Michigan Public Service Commission or the Federal Power Commission or both. Their hearings resulted in the issuance of all needed approvals and certificates.

It is one thing to complete the negotiations and hearings on a project of this kind; to put it into operation, with materials as short as they are now, is another matter. The storage fields are ready today to receive gas, but the existing pipe-line system is not adequate for the transmission job that needs to be done. Michigan Gas Storage must build 150 miles of pipe line, extending from a junction with Panhandle's line in southern Michigan to the storage fields in the north central part of the state. Of this 150 miles, 113 will consist of 24-inch pipe, 37 of 16-inch. This translates into 757 carloads of pipe, weighing 25,712 tons.

STEEL plates for the manufacture of pipe are scarce these days, and so the pipe for this project will not be delivered until 1949. After it *is* delivered and after the additional pipe line is built, the rather slow job of replacing the gas in the storage fields will begin. The procedure will be to put more gas into the field each summer than will be taken out the following winter until the original rock pressure is restored, after which input and output will balance.

To many people, underground storage of gas suggests a huge cavern—like Mammoth cave, perhaps—in which gas is confined as it is in an aboveground cylindrical steel holder. This conception is far from reality. Natural gas in the Winterfield and Cranberry lake fields was found in a formation known as the Michigan Stray, at depths of 1,320 to 1,350 feet. The Michigan Stray is a porous sandstone formation, with a porosity of about 15 per cent. The gas occupies the "pores" of the formation. Solid formations above and below the Michigan Stray cement it in and keep it from escaping, despite the tremendous pressure which the gas exerts.

This gas has remained in the Michigan Stray for millions of years, and might have stayed there for millions more if not released by the drills of man.

ANY natural gas field similar to a Michigan Stray gas field, when

converted to storage purposes, must retain a substantial part of the natural gas placed there by nature which is called "cushion" gas; otherwise ground water, which is kept out by the pressure of the cushion gas, will creep in and ruin the field. Additional gas from somewhere else (or gas to be stored) is forced in with this cushion gas. This is simple enough; it is only necessary that the pressure forcing gas into the field be greater than the pressure which is trying to force gas out of it. This advantage in pressure is gained, of course, by means of compressor stations.

When it is desired to remove gas from the field, the pressure from outside is removed and the inside pressure again forces gas out.

People sometimes ask, "Aren't you afraid to pump millions of dollars' worth of gas into a hole in the ground? Aren't you afraid it will escape?"

The answer is that any natural gas field has proved its tightness by retaining gas for millions of years. There seems to be no good reason for doubting that it will continue to hold gas, assuming that water encroachment does not exist and that certain elementary precautions are taken.

Actually, the gas is not put into one hole in the ground but into many. When the storage project was started there were 99 wells in the two fields. To permit gas to be injected and released smoothly and quickly, it will be necessary to boost the total number of wells to 334.

The drilling of 84 additional wells has been completed, and 151 more are scheduled for drilling.

So far as Consumers Power Company territory is concerned, this storage field project seems to offer the best possible answer to the question, "How can we get a sufficient long-term supply of natural gas for our customers?" It is an answer made possible by the rather special circumstances existing in this part of Michigan, especially the availability of gas fields which, unlike many fields, are easily adaptable to storage purposes.

Pending delivery of the needed pipe and construction of the 150 miles of pipe line, Consumers is still saying, "We're sorry," to applicants for gas for industrial or house-heating purposes, and it probably must continue to do so for at least two or three years.

The real benefit to be obtained from the underground storage of gas is that the public is enabled to have an adequate quantity of gas at all times, at a reasonable cost, and with the assurance of a long-time supply. The benefits to any community having such a supply are manifold and obvious. Storage reservoirs, by making these benefits possible, offer great social as well as economic values.

"THE only way to lower prices will be through increases in the volume of production without corresponding increases in hourly pay. "This will be difficult to achieve, but it must somehow be accomplished or the goods we produce will become so costly that industrial workers will no longer be able to purchase the goods that they and their fellow workers produce."

—LEONARD P. AYRES,
Vice president, The Cleveland Trust Company.

Where Is the FPC Heading In Gas Regulation?

A question of tremendous interest to thousands of oil and gas producers, to tens of thousands of land and royalty owners, and to millions of potential consumers.

By SAMUEL H. CROSBY
COUNSEL, E. HOLLEY POE & ASSOCIATES

THIS year, 1947, is the twentieth anniversary of the natural gas transportation business as it operates today. During the period from 1927 to 1932, thousand-mile, high-pressure, interstate natural gas pipe lines were built from the newly discovered Panhandle gas field in Texas to Chicago, Minneapolis, and Indiana. In this anniversary year the Federal Power Commission has frequently referred to the current "*dramatic* expansion of the use of natural gas."

An official statement of the American Gas Association gives (1946) data:

> The natural gas industry in the past decade has grown at an accelerated pace. It now serves an area with a population of 41,000,000 in thirty-three states, using a network of 220,000 miles of trunk lines and mains with a total production of 4 trillion cubic feet including other than utility sales, and a market value of $850,000,000. It has advanced from 41 to 48 per cent in the number of consumers served by the whole gas industry (including manufactured gas). Total assets are more than $4,000,000,000.

This twentieth anniversary year will remain memorable for the inception of new giant transmission systems spanning the continent, invariably financed at low interest by competitive syndicates desirous of participating in this profitable and popular field.

Reappraisal of natural gas reserves, convincing to investors, consumers, and conservationists alike, fully justifies these new pipe-line investments. Already the petro-chemical industry is anticipating formidable competition for the control of extensive southwestern gas reserves which will enormously increase the field value of future production from more than 1,100 separate known gas-producing areas in Texas.[1]

[1] API *Petroleum News Notes*, Vol. 2, No. 1, June, 1947.

This competitive demand involves adequate reserves to supply for twenty years or more several major pipe lines which will not engage in the business of production but will supply their enormous requirements by gas purchase contracts. Moreover, dry natural gas will produce motor fuels at a cost to compete with refined petroleum and an infant industry is already established for that purpose. Petro-chemical experts foresee the time when it will be cheaper to manufacture pipe-line gas from Appalachian coal beds than to buy it in Texas and bring it to the major markets.

THESE few relevant facts about the natural gas industry explain the importance of regulatory problems affecting the industry which Congress has recently been asked to solve. In due course the public, generally, probably will find a certain academic interest in the issues which, of course, are of primary importance to sellers and consumers of natural gas. They are of much more than academic interest to thousands of oil and gas producers—big and little—to tens of thousands of land- and royalty owners in the Southwest, and certainly to the 41,000,000 potential consumers mentioned by AGA.

As a result of Federal regulation since the Natural Gas Act was passed in 1938, accentuated by a recent decision of the Supreme Court, there is widespread consternation throughout the entire oil-gas industry of the principal producing states induced by a very reasonable fear that Federal regulation may be extended by the Federal Power Commission to control the economics of production wherever oil and gas are produced. Immediately following the decision referred to, the oil-gas industry felt the disconcerting impact of the decree upholding Federal claims to ownership of tidelands.

Oil is almost invariably flowed from the well by natural gas pressure. Having served this major purpose, the gas may be saved and sold to industries or interstate pipe lines. If profitable sale is impossible, the gas has usually been vented and burned. Therefore, the oil industry and the natural gas industry, wherever oil and gas are produced together, have inseparable interests. The two are industrial Siamese twins.

WITHOUT fanfare, amendments to the Natural Gas Act effectively evicting FPC from the production field, sponsored by three associations representing producers of petroleum and one from the gas industry, were introduced in Congress last February and, after extensive committee hearings, a somewhat modified bill was passed by the House of Representatives. This reached the Senate only a few days before adjournment and is pending there in committee.

The Federal Power Commission succeeded in marshaling its forces in general opposition to the proposed amendments, and its request with presidential support that no final action be taken without further deliberation was granted by the Senate committee.

These efforts to change radically the existing relationship between the oil-gas industry and the Federal Power Commission first came conspicuously to general public notice through a sudden and somewhat concerted outburst of various newspaper columnists who spread from coast to coast hypothetical

analyses of the huge rate increases to users of natural gas which they claimed would result from the enactment into law of the industry-sponsored changes. The figures used had the ring of authenticity because they were purportedly supplied by the Federal Power Commission itself.

BEFORE the second session of the 80th Congress convenes there will be time for careful consideration of the important issues which are involved. Among these are the very basic issues of state *versus* Federal regulation; the extent of delegated authority with which Congress may conclude to permanently endow the Federal Power Commission; and, although not included in the specific amendments proposed by the industry, there is likely to become involved the very real problem of the proper extent of judicial review of its administrative acts. If the issues between the commission and the oil-gas industry remain unchanged, the final result in Congress seems at this stage a fit subject for conjecture. If issues are resolved in principle between the commission and the interests chiefly concerned, followed by mutual agreement upon amendments which give adequate consideration to the rights of all, including the public interest, Congress might perhaps welcome the assistance and a large and constructive contribution might be made to future public service by the natural gas industry.

Supreme Court OK's FPC Policies

A SERIES of Supreme Court decisions culminating in the unanimous endorsement by the Supreme Court, rendered June 16th of this year, of highly controversial FPC regulatory policies brought to definite conclusion a growing conflict between those interested in the production of oil and gas and the commission. The particular issue involved the authority of the Federal Power Commission to apply its well-known net investment rate base principles to the highly competitive and chancy business of producing natural gas.

The construction of lengthy carrier systems for the transportation of natural gas, invariably requiring the investment of millions of dollars, involved many inherent risks. One of these was the necessity to assure a sufficient supply of natural gas to keep the pipe lines filled for at least a sufficient period to pay back the investment. In the earlier years of this gas transportation business, management and investors alike endeavored to obtain absolute, outright, and permanent control of known gas-producing areas ade-

¶ "OIL *is almost invariably flowed from the well by natural gas pressure. Having served this major purpose, the gas may be saved and sold to industries or interstate pipe lines. If profitable sale is impossible, the gas has usually been vented and burned. Therefore, the oil industry and the natural gas industry, wherever oil and gas are produced together, have inseparable interests. The two are industrial Siamese twins.*"

quate to supply from 25 to 50 per cent of the pipe-line capacity.

This practice was recognized and accorded the unqualified endorsement of the Federal Trade Commission in its investigation of the natural gas industry upon the conclusions and recommendations of which the Natural Gas Act was based. Various pioneer companies acquired by outright purchase of lands or mineral rights or by long-term lease hundreds of thousands of acres of gas lands at nominal cost. These were expertly brought into production and for years have supplied fluctuating percentages of natural gas to the several lines to which they are related. These reserves are now irreplaceable and have tremendous value.

It has been the policy of the pipe-line companies through the years to purchase gas from unaffiliated producers, thus increasing the long-range value of company production. The pyramiding of consumer demand which resulted in the building of new pipe lines and enlargement of the earlier ones into major gas fields has brought steadily increasing prices to independent producers, and only the law of supply and demand will be likely to level off this current trend.

In the commission's rate cases which have been litigated, the cost of gas purchased from others is customarily allowed as an operating cost if no affiliation was shown to exist between the pipe-line company and the producer. However, all gas produced by the pipeline company from its own reserves is put in at the company's cost of production, including the actual (in many cases, zero) cost of mineral rights. This results in the widest disparities and yields the pipe-line company for gas produced from its own wells only about a third of the average price it pays to others.

The regulatory power of FPC under the Natural Gas Act specifically applies

> . . . to the *transportation* of natural gas in interstate commerce, to the sale in interstate commerce of natural gas for *resale* for ultimate public consumption for domestic, commercial, industrial, or any other use, and to natural gas companies engaged in such transportation or sale, but *shall not apply* to any other transportation or sale of natural gas or to the local distribution of natural gas or to the facilities used for such distribution or *to the production or gathering of natural gas.*[8]

Counsel for the industry have contended that, by the last clause of this jurisdictional section of the law, the Federal Power Commission may not regulate in any respect the intrastate field operations of the pipe-line company, carried on to provide the gas which subsequently flows in interstate commerce, and that the commission's lawful regulation begins at the intake of the interstate transportation lines. There is usually a large compressor station at the intake point and back of it a great network of large and small gathering lines reaching out to the company's own wells and to connections with independent producers.

Counsel for the FPC contended that the exemption of production and gathering from FPC regulation merely prevents the commission from regulating the physical "activities" of production and gathering, such as well spacing. They have consistently urged that the movement of natural gas from the field of production continues without any interruption whatsoever through con-

[8] Section 1(b).

Pyramiding of Consumer Demand

"It has been the policy of the pipe-line companies through the years to purchase gas from unaffiliated producers, thus increasing the long-range value of company production. The pyramiding of consumer demand which resulted in the building of new pipe lines and enlargement of the earlier ones into major gas fields has brought steadily increasing prices to independent producers, and only the law of supply and demand will be likely to level off this current trend."

nected pipes of various functions and sizes until it reaches the burner tips of consumers in a distant market. Thus, if any continuation of the pipes which gather gas in the field shall subsequently cross a state line, the movement of the gas clear back to the wellhead becomes a part of continuous flow and transportation of natural gas in interstate commerce. Since the commission has specific jurisdiction over *transportation* in interstate commerce, the commission includes the facilities used for gathering in the rate base and determines the actual cost whether produced by the company or purchased from others.

THE first case to reach the Supreme Court involving this controversy was that of the Colorado Interstate Gas Company, decided April 2, 1945.[3] The position of the Federal Power Commission was fully sustained in a lengthy opinion by Justice Douglas but, in this case, dissent was expressed by Chief Justice Stone in which Justices Roberts, Reed, and Frankfurter concurred. The commission won by a 5-to-4 decision.

In 1946, two other important cases involving essentially identical issues reached the circuit courts on appeal. These were Cities Service Gas Co. *v.* Federal Power Commission, decided by the Tenth CCA April 30, 1946,[4] and Interstate Nat. Gas Co. *v.* Federal Power Commission, decided by the Fifth CCA August 3, 1946.[5] In the Cities Service Case, Justice Phillips registered a strong dissent, analyzing the inequities of FPC allowances for company-produced gas; and, in the case of Interstate Natural Gas Company,

[3] Colorado Interstate Gas Co., Canadian River Gas Co. *v.* Federal Power Commission (1945) 324 US 581, 58 PUR NS 65.

[4] 63 PUR NS 276, 155 F2d 694.

[5] 65 PUR NS 1, 156 F2d 949.

there was a stout dissent by Justice Waller.[6] The Supreme Court refused to review the Cities Service Case.

THE Interstate Case is the last of a series of five appeals considered by the high court. Since the Colorado Interstate decision was handed down the seats filled by Chief Justice Stone and Justice Roberts have been taken by Chief Justice Vinson and Justice Burton, both strangers to earlier controversies. When the recent Interstate (Louisiana) opinion was read by Chief Justice Vinson, counsel for the industry and for the commission itself were astonished to find that for the first time in the five years of continuous litigation over regulation of natural gas companies, the high court was in unanimous accord.

This case encompassed only that single area of controversy which is of uniform importance to almost every major natural gas company. All of the older large companies have organized their business upon the principles recognized and approved by the Federal Trade Commission, with extensive reserves of natural gas and undeveloped mineral rights constituting cornerstones in their business structure. The court brushed aside all arguments of the litigant and those in voluminous *amici* briefs submitted by lawyers representing the entire petroleum industry, and commended by the commission.

BEFORE final comment upon the conclusive impact of the decision in this case and to make clearer its full effect, the earlier victories of the commission before the Supreme Court should be briefly examined.

The commission's rate cases, the first of which was decided by the Supreme Court in 1942, laid the groundwork for regulatory policy and procedure. Exact rules and procedural requirements have been filled in by the commission and its staff during the intervening five years to complete the commission's present comprehensive scheme of regulation which rigidly controls every important operation of the business. In the course of this process of development the commission has seldom receded from any position taken but rather has edged out upon the industry here and there, tempering any intrusion upon doubtful ground to avoid alarming "jumpy" management. Not long since there were tentative approaches to regulation of direct industrial sales. Currently, some observers think there is a gingerly exploration of the politically dangerous business of intersystem allocations of gas supply.

"A New Chapter in the Regulation of Utility Rates"

THIS phrase was used by Justice Black in his concurring opinion approved by Justices Douglas and Murphy in the Natural Gas Pipeline Case, decided in March, 1942.[7] In that case the opinion of the court, by Chief Justice Stone, upheld the constitutionality of the Natural Gas Act, and approved rate reduction by interim order, a new technique.

Justice Frankfurter filed a brief concurring opinion in this case and there were no dissents.

[6] For a concise and comprehensive analysis of these cases, see "Is FPC Regulating Production-gathering of Natural Gas?" by John J. Hassett, PUBLIC UTILITIES FORTNIGHTLY, Vol. XXXIX, No. 10, p. 622, May 8, 1947.

[7] Federal Power Commission *v.* Natural Gas Pipeline Co. 315 US 575, 42 PUR NS 129.

The important case of Hope Nat. Gas Co. *v.* Federal Power Commission[8] reached the circuit court of appeals for the fourth circuit in 1942, shortly after the U. S. Supreme Court decision was handed down in the Natural Gas Pipeline Case. The Hope Case was replete with important questions upon which the newly constituted (1937-1941) Supreme Court had not passed. The opinion of the court[8] was written by Justice Douglas, Justices Black and Murphy concurring in a brief separate opinion. Justice Roberts took no part in the consideration or decision of the case. Justice Frankfurter, Justice Reed, and Justice Jackson each filed dissenting opinions. The forceful discussion of the issues of the case and the exhaustive analysis of judicial precedent presented in Circuit Justice Parker's opinion may have stimulated the justices of the higher court to thorough and equally vigorous expression of their various views.

Just by way of brief review of the positions taken by the various justices in the Hope Case, let us glance first of all at the majority opinion by Justice Douglas. He disagreed with the lower court opinion by Justice Parker on an important point which has since come to have a rather noteworthy influence on at least one state regulatory agency.[9] Justice Parker had taken the position that while the Natural Gas Act makes no provision for a "fixed rate base" or any one formula for determining "fair value," nevertheless, the test of nonconfiscatory rates is that they "must allow a fair return on the present fair value of the property." This would, of course, mean that "the commission must find what the present fair value of the property is."

Justice Douglas challenged these conclusions, stating that "rate making is but one species of price fixing" and "may reduce the value of the property which is being regulated." In other words, Justice Douglas regards "fair value" as the "end product of the process of rate making, not the starting point." This leaves the "end result" of the rate order the controlling standard regardless of method or even "certain infirmatives" of methods. The court's presumption is in favor of the expert judgment as to questions of method.

Justice Frankfurter objected to such

[8] Federal Power Commission *v.* Hope Nat. Gas Co. (1944) 320 US 591, 51 PUR NS 193.

[9] The Wisconsin Public Utilities Commission in the recently decided case of Two Rivers *v.* Commonwealth Teleph. Co. (1947) 70 PUR NS 5, abandoned the fair value concept in fixing telephone rates and based its decision on the so-called "police power" of price fixing.

¶ "In *the* [*Federal Power*]*commission's rate cases which have been litigated, the cost of gas purchased from others is customarily allowed as an operating cost if no affiliation was shown to exist betwen the pipe-line company and the producer. However, all gas produced by the pipe-line company from its own reserves is put in at the company's cost of production, including the actual . . . cost of mineral rights.*"

a sweeping presumption. He said: "It will not do to say that it must all be left to the skill of experts." The dissent of Justice Reed likewise stresses his view that Congress "did legislate in the light of the relation of fair and reasonable rates to fair value and reasonable return. The commission must therefore make its findings in observance of that relationship."

JUSTICE Jackson's voluminous dissent was by no means confined to a discussion of the issues upon the decision of which the case turned. He went into the desirability of conservation, indicating that, in his view, the FPC should be endowed with greater regulatory authority rather than less, including the authority "to fix the price of gas in the field as one would fix maximum prices of oil or milk or coal, or any other commodity."

His concluding observations were doubtless intended to inspire new courage in FPC and to be a shibboleth of action.

The next case to reach the Supreme Court was the Colorado Interstate Case, decided in April, 1945,[10] and at the same term an opinion was handed down upon a limited review of the Eighth CCA decision of the Panhandle Eastern Case.[11] In the Panhandle Case, for the first time, FPC, in arriving at a rate base, refused to receive or consider evidence of present value and adopted a net investment rate base—original cost less depreciation. In granting limited review, the high court had refused to consider this action of the commission.

AGAIN, in Colorado Interstate, Justice Douglas wrote the opinion of the court, and Justice Jackson, in a concurring opinion, reaffirmed views he had expressed in the Hope Case. Chief Justice Stone, supported by Justices Roberts, Reed, and Frankfurter, dissented strongly to the commission's assumption of jurisdiction to regulate the price of gas produced and gathered by Canadian River Gas Company (an affiliate of Colorado Interstate) to supply the line from the Texas Panhandle to Denver. Chief Justice Stone said:

> The exclusion of production and gathering of natural gas from the regulatory authority of the commission is a command to the commission not to regulate that which is excluded. Otherwise powers reserved to the states would be encroached upon contrary to the words and purposes of the act and a pretended government would be set up by commission action, without the authority of Congress.

What Price Victory?

THE U. S. Supreme Court has now confirmed the commission's power and sustained its administrative acts on every point of issue raised by the industry. However, the final crowning victory in the Interstate Case, 69 PUR NS 1, 67 S Ct 1482, with its implications of the confidence of a unanimous court, has its price. The issue of this case involved the jurisdiction of the Federal Power Commission to regulate sales made in the field by petitioner to three pipe-line companies, each of which transports the gas so purchased to markets in states other than Louisiana.

Counsel for the commission relied upon the contention that the sales and deliveries to interstate pipe-line com-

[10] Colorado Interstate Gas Co. *v.* Federal Power Commission, 324 US 581, 58 PUR NS 65.

[11] Panhandle Eastern Pipe Line Co. *v.* Federal Power Commission, 324 US 635, 58 PUR NS 100.

Long-term Contracts

". . . . private industry, having hundreds of millions of dollars invested in the oil-gas business, is now officially invited to enter into long-term contracts of great importance with unquestioning reliance upon a majority promise of an appointive board that it will not enforce against them certain of its administrative duties the Supreme Court has found to exist. The oil industry, at least, has had expensive experience with delusory official promises of immunity of which these current events may prove reminiscent."

panies are both (1) sales for resale in interstate commerce, and (2) transportation in interstate commerce. They contended that there is transportation in interstate commerce whenever the gas from a group of wells, "gathered" in a minor area, is conveyed by any pipe, large or small, for any "considerable" distance before its delivery into the interstate pipe line.

THE court's opinion by Chief Justice Vinson contains a brief discussion of broader aspects of the case, including courteous disagreement with the principal point of former Chief Justice Stone and his dissenting associates in the Colorado Interstate Case that Federal regulation of production and gathering would constitute a dangerous intrusion upon the prerogatives of state governments, stating that the record in this case fails to disclose any element of encroachment. The court's far-reaching decision concludes with the following paragraph:

> . . . The gas moved by petitioner to the points of sale consisted of gas produced from petitioner's wells commingled with that produced and gathered by other companies and introduced into petitioner's pipe-line system during the course of the movement. By the time the sales are consummated, nothing further in the gathering process remains to be done. *We have held that these sales are in interstate commerce. It cannot be doubted that their regulation is predominately a matter of national, as contrasted to local, concern. All the gas sold in these transactions is destined for consumption in states other than Louisiana. Unreasonable charges exacted at this stage of the interstate movement become perpetuated in large part in fixed items of costs which must be covered by rates charged subsequent purchasers of the gas including the ultimate consumer. It was to avoid such situations that the Natural Gas Act was passed.* (Italics supplied.)

To be sure, there is a footnote reference to cases in which the Supreme Court has previously held that

> . . . the reasonableness of cost items such as that incurred by a purchasing pipe-line company in acquiring gas for transportation may be inquired into during the course of sub-

sequent regulation when buyer and seller are affiliated corporations and there is evidence that the sales were not made at arm's length.

But the court's mandate contains no condition of affiliation or monopoly as a prerequisite to jurisdiction and regulation.

THE equal application of valid laws is, of course, a fundamental concept of our state and Federal Constitutions and of our jurisprudence. The principle is inherent in this opinion. The decision contemplates no distinction or discrimination between the regulated company, landowners, royalty owners, affiliated producers, "independent" producers. *In the court's view it is clearly the obligation of the commission to investigate and control prices paid to all producers of natural gas entering interstate pipe lines.*

The commission is well aware of the difficulties attending price regulation of by-product gas from the oil fields. During committee hearings it had urged Congress to defer any legislative action until the Second Session of the 80th. Near the end of the First Session, after the decision in the Interstate Case, it asked Congress in vain for emergency relief from the immediate effect of its overwhelming victory. The Congress failed to act and the Federal Power Commission took refuge in the adoption of a Substantive Rule of Procedure.

A FORMAL order was adopted containing the following broad and unequivocal statement of administrative policy:[12]

> The commission gives its assurance to independent producers and gatherers of natural gas that they can sell at arm's length and deliver such gas to interstate pipe lines and can enter into contracts for such sale without apprehension that in so doing they may become subject to assertions of jurisdiction by the commission under the Natural Gas Act.

There is one vacancy on the board. Three commissioners voted for the order.

Commissioner Draper dissented stating that he did so "with a complete understanding of the practical difficulties" motivating his associates of the majority.

In his opinion:

> . . . it is now too late for the commission to issue any order which might be interpreted to constitute a legal limitation upon its power . . .
>
> This is an exemption which, in my opinion, should come from the Congress and not from the commission.

In a sellers' market, with unit prices responding to competitive demand and "escalator" clauses required by many producers, the commission's regulatory problems now in the making may well prove hydra-headed. Few would question the sincerity of the commissioners joining in this official action. The fact remains that private industry, having hundreds of millions of dollars invested in the oil-gas business, is now officially invited to enter into long-term contracts of great importance with unquestioning reliance upon a majority promise of an appointive board that it will not enforce against them certain of its administrative duties the Supreme Court has found to exist. The oil industry, at least, has had expensive experience with delusory official promises of immunity of which these current events may prove reminiscent.

[12] Order 139, Docket No. R-106, adopted August 7, 1947.

Underground Gasification of Coal at Gorgas

An authoritative description of the pioneer experiment conducted in the coal mine of the Alabama Power Company which has challenged the attention of gas utility men throughout the nation.

By MILTON H. FIES*

One of the aspects of the experiment in the underground gasification of coal conducted coöperatively in Alabama by the U. S. Bureau of Mines and the Alabama Power Company which evoked the greatest surprise to these participants was the great interest of people generally in the venture. It was refreshing to be associated in a work with the Bureau of Mines. Efficient, earnest, reasonable—this agency always has been able to work unselfishly with all citizens who seek to forward the development and progress of the country.

This public interest in the experiment, however, also brought some unique circumstances. It has been necessary to explain in detail and at length on innumerable occasions that in the normal course of things one cannot draw definite or final conclusions from a single experiment; that in dealing with noxious gases, with the weight of a portion of the earth's surface, and with extremely high temperatures, it is impossible and unwise to define a pattern from a single test involving these forces; that research is synonymous with both time and patience; and that any individual with a reasonable amount of prudence and a fair sense of responsibility is naturally restrained until all of the facts are determined.

It is in this spirit that the writer presents a general description and summary of this initial investigation in this country relating to the underground gasification of coal.

The conception of the gasification of coal in place is not new. In 1868, nearly eighty years ago, Sir William Siemens of the Department of Scientific and Industrial Research of Great Britain sug-

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gested the gasification of slack and waste coal in the mines. Twenty years later, in Russia, Professor D. I. Mendeleev alluded to its possibilities. The first patent, however, was issued to an American, A. G. Betts, in 1909 in England.

In March, 1912, Sir William Ramsay, at a smoke abatement luncheon in London, suggested that "just as deposits of salt were worked, not by mining salt, but by pumping in water which was recovered as brine, so it would be ideal, instead of mining coal, to have retorts in the bowels of the earth for the production of gas." Sir William Ramsay had made plans to undertake an experiment at Tursdale Colliery in Durham when his death prevented.

At this time Lenin was in political exile in Cracow. He wrote an article for *Pravda* and referred to Ramsay's opinion. When Lenin came into power in 1917, and no doubt recalling Ramsay's suggestion, he fostered practical research in this field.

It is not possible to determine the extent of underground gasification of coal in Russia or the measure of its accomplishment. Scientific articles from that country state that prior to the war many large industries derived their energy from gas thus produced. The larger gas stations in Russia were then located in the Donetz basin, in Siberia, and near Moscow. Since the war, we have not been able to ascertain, with any degree of confidence, just what is being done in Russia.

THE Russians have used several methods of burning coal underground. One plan involves the driving of entries into the coal seams in the shape of a "U," as was done at Gorgas. The base of the "U" is fired and air is blown into one side of the "U" by means of a blower and the gas drawn out the other. With a system of piping and valves connecting the blower to the underground passages, it is possible to reverse the flow of the air, and by this means effect some control of the flame.

In another method, which the Russians also used, holes were drilled from the surface at fixed intervals over the entire area to be burned and the coal between the two holes connected underground and then fired; or the bottom of one hole was ignited and air forced through the cleavage planes in the coal, thus carrying the gas from one hole to another until the coal between the two initial holes was completely burned. After the coal between the two holes was entirely consumed, the passage of the air between them was less restricted. But, if in the burning the passageway between the holes became plugged, additional holes were ignited. Another method was to use two concentric pipes in the holes, fire the bottom of the holes, blow air down the pipes, draw the gas out between the pipes until the coal between the holes was burned. After this coal was burned, it would be possible to blow down through the pipe in one hole and draw the gas out of the other pipe in the second hole.

There are modifications of the methods mentioned. The one employed at Gorgas was not new, as has been previously stated. It was one used by the Russians in the gasification of coal in inclined seams.

In 1943 there was some discussion in the Bureau of Mines that a commission from this country would visit Russia to investigate the progress of subter-

ILLUSTRATION A
Preparation of entry tunnels; clay bags to limit burning.

ranean gasification there, but since the war the matter has not been followed.

In the experiment at Gorgas the prime interest of the Bureau of Mines was in the production of a synthesis gas, while that of the Alabama Power Company was directed toward a power gas for consumption under steam boilers at its 200,000-kilowatt plant at Gorgas. The experiment, of course, was capable of producing both, and did.

THERE is some question in the minds of engineers and geologists as to the amount of reserves of petroleum and natural gas in the United States. In order to maintain a factor of safety it is indisputable that a means of producing a low-cost synthesis gas from which gasoline can be manufactured is indispensable. Hence its importance cannot be overemphasized. If this underground gasification can be worked out on a sound economic basis, it will be of immeasurable value in the future of the nation.

The Alabama Power Company, in addition to its interest in a gas for consumption under its steam boilers, is watching the progress in the development of the gas turbine. Here is a machine with great implications as it relates to underground gasification.

The Bureau of Mines and the Alabama Power Company entered into a coöperative agreement in October,

1946. It is a statement of fact that had it not been for the interest and untiring encouragement of the president of the Alabama Power Company, Thomas W. Martin, the work would never have been undertaken in Alabama at this time. Under the agreement the power company furnished the site, together with supplies and labor necessary for the construction of the plant. The bureau furnished the technical advice, field men to supervise the work while the underground development and subsequent tests were in progress, together with the necessary instruments and laboratory equipment.

Several division chiefs from the bureau came to Gorgas and assisted in the decision as to the location for this initial experiment. The first consideration was isolation—the site must be one which could be completely and unequivocally separated from the power company's 17,000-acre coal tract, from which acreage the company was producing some 2,000 tons of coal per day for its Gorgas steam plant. In the selection of the site all the interested parties first had in mind the underground mine fire at Straightsville, Ohio, which has been burning for some fifty years, despite every effort to extinguish it. There could be no guessing on this point. So, a shallow coyered narrow peninsula, some 240 feet wide at the outcrop of the upper seam and about 500 feet long, was chosen. Actually, the tract contained two seams (separated by some seventy feet) but only the top seam, known as the Pratt seam, was fired.

THE seam in which the experiment was conducted was 3 feet thick and approximately horizontal. It was realized when the site was selected that the physical conditions pertaining to the experiment would present disabilities and handicaps. We believed before we started that the shallowness of the underlying strata, only about thirty feet, the weathered nature of the roof over the coal, the limited capacity of the secondhand blower, the likelihood of burn outs to the outcrops—all these factors were not conducive to smooth sailing or good gas. But we were willing to sacrifice all considerations if, as stated, we could isolate the fire, find out what happened by removing a portion of the strata after the experiment was completed, observe the progress and nature of the combustion through peepholes, and make connection underground from the surface at frequent intervals where we might sample the gas, measure the temperature, and record the pressure at these various points. This shallow area filled the bill as to these fundamentals, although the entailed headaches were many and severe.

Consequently, having selected the area to be fired, it was completely separated by means of an open cut, or trench-like, open top corridor cleared straight across the neck of the peninsula, creating also a cliff wall suitable for beginning preparatory operations from the side, directly into the interior. This open cut was dug through the Pratt seam and the overlying strata, which is a weathered carbonaceous shale.

From this open cut corridor, which was situated generally north of the area to be fired, two tunnel entries were made into the face of the south wall of the open cut. These were to extend along the east and west sides, respec-

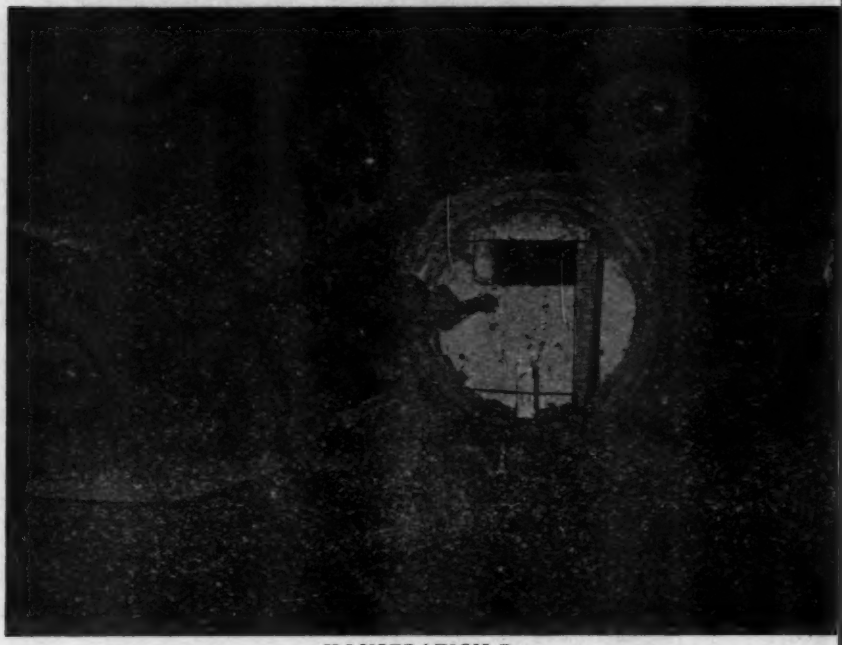


ILLUSTRATION B

tively, of the area or "island" of coal to be fired. These entry tunnels, 6 feet wide and 3 feet high, were supported by steel rails as cross collars every 2 feet. The two tunnels ran parallel, 40 feet apart, and were connected at their interior ends by a crosscut corridor tunnel. The net result was a sort of squared "U-shaped" tunnel running around an interior area of coal, 40 feet wide and averaging 150 feet deep.[1]

THIS crosscut tunnel, which connected the two legs of the squared "U" at the interior ends of the entries, was not supported by steel rails. But it was deemed necessary to give it another special treatment in order to assure air circulation when the fire was started. This was done by undercutting the inside bottom edge to a depth of 18 inches and 8 inches high, so as to produce a small running alcove, recessed in the bottom of the inside wall of the crosscut. The purpose of this, as already stated, was to permit continued air circulation even though the roof of the crosscut should fall at the very beginning of the experiment. The crosscut was filled with loose coal and some wood, and oil was put under a drill hole (through the top of the roof of the crosscut to the surface) to make certain of ignition.

[1] Because the open cut was somewhat diagonal to the two parallel entry tunnels, the area circumscribed by the "U" was accordingly somewhat trapezoidal in shape rather than rectangular. The exact dimensions were: east entry, 143 feet long; west entry, 171 feet long; connecting crosscut, 40 feet.

The outer ribs of the east and west entries were lined with clay bags to limit the burning as far as possible to the central area or "pillar of coal." (See illustration A.)

Then it was necessary to prepare the outside of the peninsula for the experiment. Both sides (east and west) were cut away with a bulldozer. Next, there were driven into these exterior sides, 8 observation tunnels, called "adits"—and actually in the nature of portholes, to enable observers to watch the progress of the experiment while the firing was going on. Four of these adits were driven into each side, to within 4 feet of the legs of the "U." Six of them were equipped with pyrex glass port windows sealed into the end. The other two—directly in line with the crosscut where the fire was started—had concrete pipes and explosion discs in addition to the observation ports. These observation ports were protected by sandbags as far as possible. Each port was equipped with a thermocouple, gas sampling and pressure-measuring pipes. (Illustration B shows one of these observation ports with blow-out vent, pyrex glass covered peephole, and instruments.)

NEXT came the operations from the top of the peninsula. A series of holes, 20 in all, were drilled from the surface straight down into the pillar of coal to be fired. Sixteen of these were drilled initially—in rows of 4, about 10 feet apart—in the south end of the circumscribed area. Four additional holes were driven straight down into the crosscut several weeks after experiment had been in progress, in order to ascertain the extent of burning towards the south. All of these holes were equipped with sampling and other instruments. (See illustration C.)

It was now necessary to prepare the project for the circulation of air pressure. About 10 feet from the entrance to each of the two entry tunnels, a pair of concrete pipes (24 inches in diameter) were sealed into the passageways. These were connected to a blower[8] and stacks by means of steel pipes (also 24 inches in diameter). These steel pipes from the blower were equipped with valves which permitted the reversal of the flow of air and combustion gas through the mine. Also, water sprays were provided to prevent overheating in the pipes, stacks, etc. In addition to the blower, pipe, and other equipment, there was located in the open cut corridor a 125-horsepower steam boiler for the purpose of purging and producing water gas. (See illustration D.) Blow-out flanges or discs were inserted in the pipes at points directly in line with the mine openings so as to relieve the pressure in case of an explosion.

ON January 20, 1947, several magnesium bombs were dropped through sampling pipe No. 1, which was then capped. Ignition was rapid, and within five minutes heavy smoke poured from the west stack (illustration E), and within two or three hours the thermocouple recorded a temperature of 1,000 degrees Fahrenheit in the burning area. And within that same time, adit E burned through the small 4-foot pillar, which produced leaks to the outside. Hot gases and flames had been sweeping the pyrex glass covered peephole in this adit and the clay bags which had been packed and piled as

[8] The blower was a positive pressure type capable of delivering 7,350 cubic feet a minute at 2 PSI at 175 revolutions per minute.

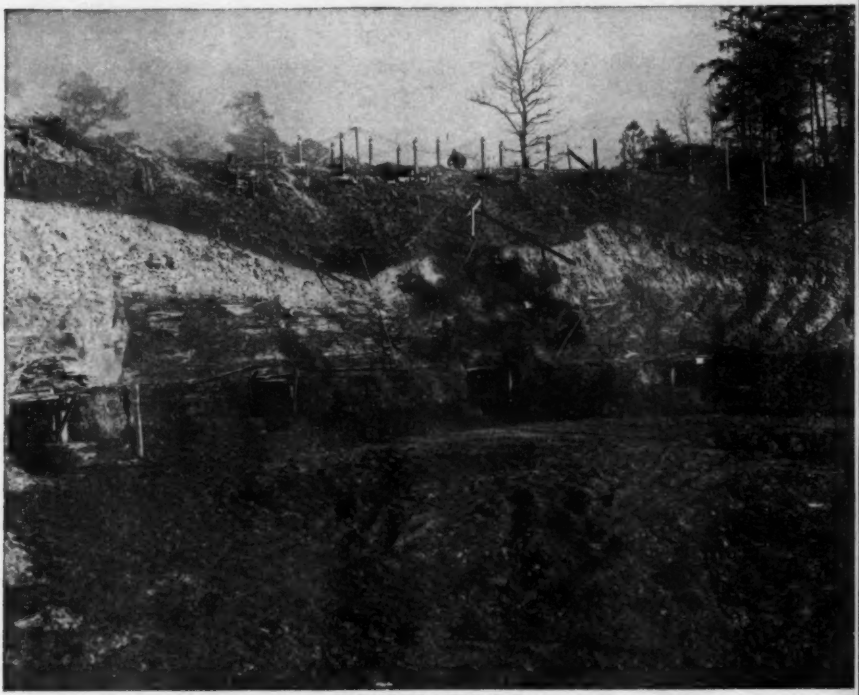


ILLUSTRATION C

The west observation crosscuts showing pipes leading to burned-out area with thermal couple wires leading from pipes and pressure valves on top of pipes.

close to the port as possible afforded little protection against the flame. It then became necessary to close off this adit by filling it with rock dust in bags and pushing earth into the remainder of the portal with a bulldozer, and then covering it with earth.

During the first week or ten days of operation all of the 8 adits leaked and had to be sealed off. These difficulties, coupled with others, plus interruptions due to breakdowns of the secondhand blower, made it impossible to achieve continuous operation or constant conditions during this important period. Although my colleagues in the experiment do not agree with me, I am of the opinion that we never quite recovered from these initial setbacks. But we were sailing an uncharted sea, and what transpired was just what one would expect under the circumstances.

During the entire course of the experiment an attempt was made to center the combustion in, or near, the crosscut by reversing the air flow from time to time. This procedure was not altogether satisfactory since both entries tended to burn toward the source of oxygen. Then trouble developed where the pipes from the blower entered the pipes in the legs of the "U."

All of the leaks became so serious that gunniting was resorted to and was carried on almost entirely during the remainder of the time.

We are convinced that more air through the system would have yielded higher temperature and richer gas.[3] It is also obvious that the elimination of leaks can be realized by gasifying coal under heavier cover; and, further, greater air velocities or preheating the intake air would further enrich the gas.

One of the detailed studies during the experiment was made to determine the change in gas composition as it traveled the underground circuit. It was found that practically all of the oxygen was consumed in the first one-third of the passage and the carbon monoxide concentration averaged about 13 per cent at this point, and some periods ran as high as 22 per cent. We also found from the analyses that it was likely that some oxygen passed around and away from the hottest combustion zone and then rejoined the gas stream to react with carbon monoxide. That was not good, but we think that the passage of the oxygen can be controlled. However, the point of significant importance is that a gas of a heat content near or over 100 British thermal units (BTU) per cubic foot can be obtained by underground gasification *with air alone*. Further experimentation is needed to determine exactly what these conditions are and the measures necessary to maintain them.

By this we do not mean to convey that we maintained 100 BTU with air alone during all of the time. We ran from 20 to 76 BTU per cubic foot, with an average of about 50. But for six days continuously—and this is impressive—we averaged 70 BTU per cubic foot despite the surmountable disabilities and impediments recounted herein. We often reached 90 BTU and the maximum determined value was 108 BTU.

The average composition of the 70 BTU gas was:

Constituents	*Symbols*	*Percentage*
Carbon dioxide	CO_2	11.7
Oxygen	O_2	0.4
Illuminants	—	0.2
Hydrogen	H_2	7.0
Carbon monoxide	CO	9.1
Methane (marsh gas)	CH_4	1.4
Nitrogen	N_2	70.2

During a 4-day period, the effect of oxygen in the gasification was studied, using oxygen-enriched air (34 per cent oxygen), oxygen-air-steam (oxygen 32, nitrogen 43, and steam 25), and oxygen-steam (oxygen 65, steam 35). Oxygen was obtained from a tank car of liquefied gas. A special truck for vaporizing the liquid oxygen was provided and the oxygen was then carried by pipe line to the operations. The truck had a limited capacity of only 200 cubic feet per minute, and hence the results do not by any means indicate the possible improvement which might be attained by the use of a much larger amount of oxygen.

[3] When the experiment began we operated under a blower pressure of 8 inches of water, with an air flow of 2,400 CFM. Within a few days, under the same pressure, the air flow was reduced to 1,200 CFM. Finally, it became necessary to increase the pressure to 40 inches of water to maintain this reduced flow. Obviously a much higher air flow would have been desirable, but the blower was capable of a maximum of 48 inches of water; and, later, when the leakages through the coal to the outcrop, through the overlying strata and around the stoppings, became excessive, even that pressure could not be maintained.

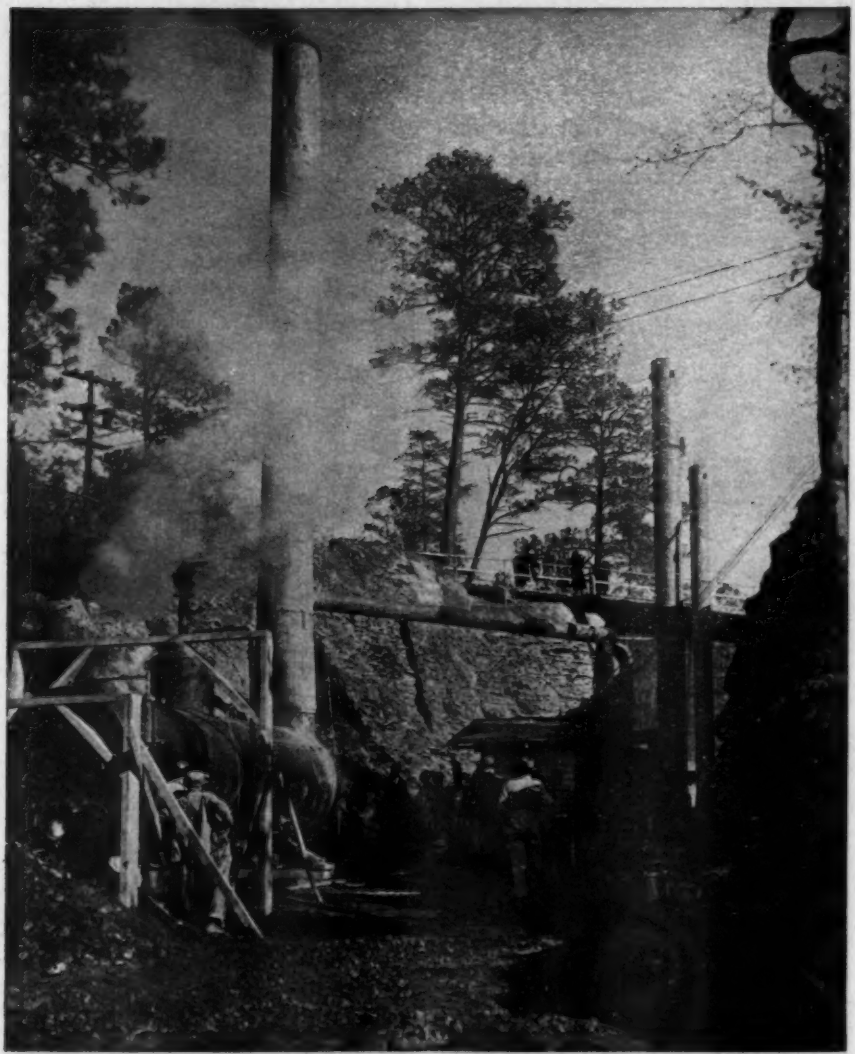


ILLUSTRATION D

Analysis of this gas showed a high concentration of carbon dioxide, indicating insufficient temperature and the lack of good conditions for carbon monoxide and hydrogen production. Likewise, a much larger flow of oxygen would have materially improved gas quality.

The oxygen-steam gas of 134 BTU analyzed:

Constituents	*Symbols*	*Percentage*
Carbon dioxide	CO_2	59.6
Oxygen	O_2	1.9
Illuminants	—	0.4
Hydrogen	H_2	18.8
Carbon monoxide	CO	8.6
Methane (marsh gas)	CH_4	3.7
Nitrogen	N_2	7.0

We made many runs when steam alone was passed through the mine. This was done to determine the quality of gas that might be produced in a cyclic operation; namely, a blow cycle to heat the coke underground, and then follow this with a steam cycle. Heating values of from 146 to 319 were realized.

The analysis (calculated air free because of leaks which existed at the time) of this 319 BTU gas was:

Constituents	*Symbols*	*Percentage*
Carbon dioxide	CO_2	17.0
Oxygen	O_2	—
Illuminants	—	0.8
Hydrogen	H_2	54.4
Carbon monoxide	CO	10.6
Methane (marsh gas)	CH_4	9.0
Nitrogen	N_2	8.2

Here it may be well to state that, before reversing the flow of gas through the mine, pumping with steam was carried on for two minutes using 2,000 pounds steam per hour. The gas product during these periods had a heat content regularly of 195 to 256 BTU.

I HAVE presented the analyses of higher BTU gas solely to illustrate the possibilities and for the reason that when the experiment was undertaken, and during its course, gas quality was a secondary consideration. It was realized at the outset that the physical conditions surrounding the experiment, to which reference has been made, would necessarily adversely affect the quality of the gas. What was sought primarily was definite information as to the combustion of coal in its solid strata in the earth, control of combustion, the action of the roof, and the effect of high temperatures on the overlying strata. This information we obtained.

No one connected with the experiment discounts the importance of the quality of the gas. It is indeed essential in the final determination of the merits of the process. The good quality gas emphasized herein is indicative of what can be realized if conditions surrounding the process can be made constant; hence these analyses submitted are interesting and important. In this connection, during a period from February 18th to February 24th, the make-gas from the experiment was utilized under the boiler at the project for making steam.

The operations continued for fifty days. Leakage of air and gas through the coal seam, through slips and crevices in the overlying strata, became excessive with a blower pressure of 40 inches and an air flow of 1,200 cubic inches. The gunniting became ineffective; consequently, on March 12th, the operations were terminated because it was felt that little more could be learned by continuing the combustion.

The mine was steamed for several days and then water run in until it was 18 inches deep at the deepest places, in order to reduce the temperature to a point where we could drive into the mine and uncover a portion of its area.

When the temperature reached approximately 250 degrees Fahrenheit we started driving back in. Three of the observation adits were opened and a new southeast adit extended to the new coal or coke face. A cross entry was cut

ILLUSTRATION E

Smoke from pipe stack directly after the fire was lighted.

completely from one side of the hill to the other, and in this way we were able to examine an entire cross section through the area.

ILLUSTRATION F shows where we drove in, and in addition shows the open cut that was made on the south end of the area. The examination revealed that the roof had fallen down completely and all passages were filled with fused, softened, or broken material from the overlying strata. In some areas the roof rock had fused and melted, and in others it had become sufficiently plastic to flow down tight on the bottom or over the coke face. There was no caving to the surface, although the cover over the coal was from only 30 to 40 feet.

It will be noted from illustration G, which shows the area which burned out and coked, that there was a roof exposure in places along the crosscut which was 60 feet long and 25 feet wide in places. There was a total of 400 tons of coal burned and coked. Thus there was sufficient exposure of roof covering an area which would have caved that shallow cover to the surface had it not been for the fact that the rock which fell expanded from two to

three times its original volume and maintained sufficient strength to hold up the overburden and prevent subsidence.

SHALE is the predominant strata which overlies most of our coal seams in the United States, and if the swelling and expansion of the rock which came down are indicative of what we may expect from all shales which overlie coal seams, and if after expanding these shales they show sufficient strength to hold up the remaining roof, one of the causes of pessimism and doubt as to the practicality of underground gasification will have been eliminated.

We sent a sample of the rock overlying the Pratt coal seam at Gorgas to the Pittsburgh station of the U. S. Bureau of Mines before we undertook the experiment. This slab of rock was 20 inches square at the bottom and 13 inches thick. It was placed on a gas oven and subjected to about 2,700 degrees temperature.

What happened in the experimental mine corroborated generally what happened to the rock on that gas oven, which means that we may be able to test strata in a laboratory and get a very clear conception of what the rock will do when the coal below it is gasified in a mine. Incidentally, this 2,700 degrees temperature attained in the laboratory experiment gives us a very definite idea that temperatures we reached in the mine probably exceeded 2,700 degrees.

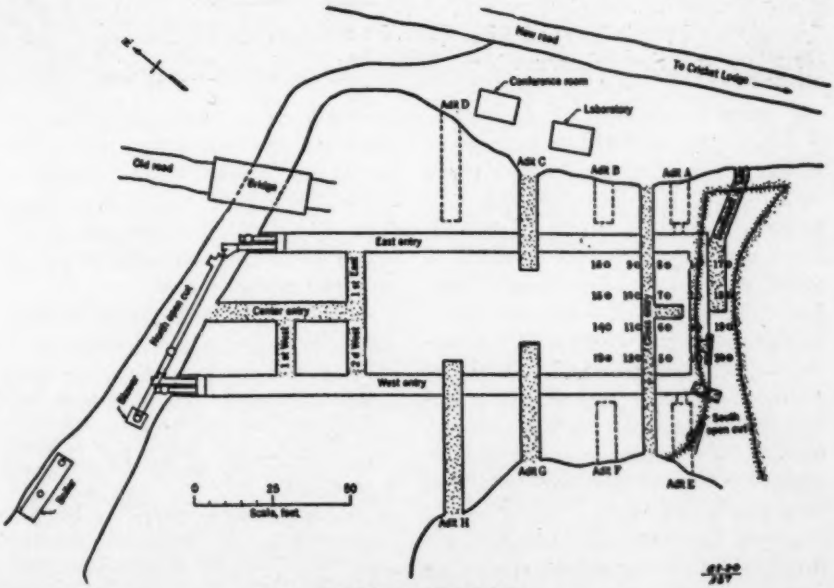


ILLUSTRATION F

Exploration map of underground gasification residue.

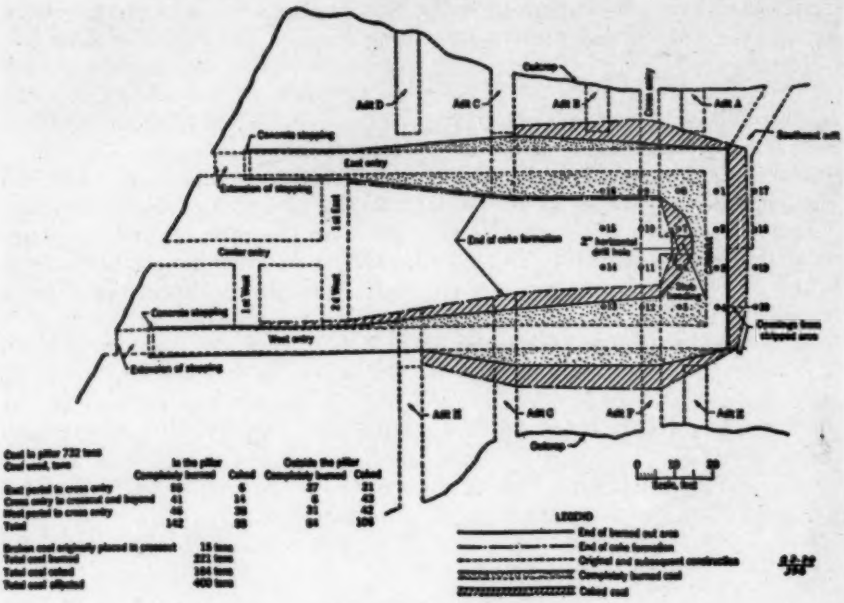


ILLUSTRATION G
Coal utilization.

ALMOST interesting part of the experiment, and, as far as we know, an innovation, was the tests we made on air flow after we went back into the burned-out area. We closed off with doors each of the points of entrance which were made after the area was cooled, and then by opening each of the doors separately we were able to measure the air flow with an anemometer. Then, all of the doors were closed and men with oxygen-breathing apparatus went into one of the entries; the blower was started and these men were able to ascertain that the coke was sufficiently porous to permit the passage of air through the pores, and were able to actually feel the movement and pressure of the air at coal-rock interface.

The other interesting point in connection with the experiment was that we burned the coal clean. The ash of the coal was down on the bottom and there was no uncombined carbon. On top of the ash we found the rock from the strata above the coal.

From this preliminary experiment we can draw these conclusions:

1. That combustion can be maintained without difficulty in a solid strata of coal in the earth, and in the passage of about 300 feet, or probably less, practically all of the oxygen is consumed.

2. That coke precedes the complete combustion, and that the coke produced is satisfactory for producer or water-gas operation, providing that oxygen and steam can be forced through this bed.

3. That coal can be burned and gasified completely underground.

4. That in this particular experiment we did not get our temperatures high enough to secure maximum results.

5. That the roof will fall following combustion of the coal, and that in this mine these falls did not stop the flow of air or combustion, but did increase the back pressure on the blower.

6. We burned and coked a total of about 400 tons of coal.

7. That with air, oxygen, and air-oxygen-steam blasts, gases can be produced which can be used for generating power, and that oxygen-steam blasting, or steam alone, will produce a gas suitable for synthesis purposes.

FINALLY, it should be emphasized that we have performed one experiment in the United States, and that experiment may be regarded as a success. We need to do more work; perform additional experiments. All of the affected industries — petroleum, chemical, gas, utilities, railroads, and above all the coal people, should join hands with the government and contribute their talents and means toward the successful working out of the underground gasification of coal, which is capable of producing so much, not only toward our national security, but toward the welfare of all our people for years to come.[4]

[4] Much of the data presented herein were obtained from a paper prepared by Dr. W. C. Schroeder, chief of the Office of Synthetic Liquid Fuels, U. S. Bureau of Mines, and the writer, for presentation at a joint meeting of the fuels division of The American Society of Mechanical Engineers and the coal division of the American Institute of Mining and Metallurgical Engineers, to be held in Cincinnati, Ohio, October 20, 1947.

Where Do Jobs Come from?

"JOBS come from ideas. An idea is a mechanical refrigerator, an automobile to take the place of a horse, a new food, a coaxial cable to transmit the patterns of television.

"But an idea in the raw is only the first step.

"Management must find the money (it costs an average of $5,000 to create a single job in modern industry), hire the employees, perfect special techniques for economic manufacture, organize the distribution, inform and persuade the potential buyer.

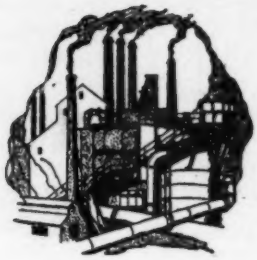
"Then, and only then, does the idea become productive and serve the greatest number of people. In terms of jobs, what are the results of ideas developed by American management?

"Since the turn of the century, at least 12 new industries have appeared on the roster of American manufacture.

"By the energy and vision of management, there has been created directly or indirectly from these industries a total of more than 7,000,000 jobs.

"Neither the men and women in industry nor the money in industry can be effective without good management. Nothing else is so important to the workers' welfare, the investors' welfare, or the public welfare."

—EXCERPT *from advertisement of N. W. Ayer & Son, Inc.*



Utilization of Natural Gas In the Chemical Field

It is changing the sky line of the Gulf coast of Texas and lower Louisiana, bidding for the nation's chemical supremacy of tomorrow.

By RALPH S. CHILD*

Down in the land of cotton and cane, cattle, oil, shrimp fisheries, timber, and rice—the Gulf coast of Texas and lower Louisiana—a great new industry, chemicals, is changing the sky line.

Natural gas, found in huge and increasing quantities in this area, has a significant rôle in an exciting advance into new industrial fields. Along with its close relative, oil, it is one of the chief sources of hydrocarbons used as a raw material for manufacture of chemicals by processes and techniques fresh from the laboratory.

Travelers along the Gulf coast, passing by great ranches dotted with grazing cattle, lush green rice fields or farms, are startled to come upon grotesque, sprawling installations of pipe-festooned towers, groupings of tanks of all sizes and shapes, with smoke erupting from smokestacks, men at work, tank cars, and trucks moving.

Such plants, rising from the low flat plains, make up the young but mighty chemical industry. It is through them that the Gulf coast bids for the nation's chemical supremacy of tomorrow.

Natural gas is one of the high cards held in the area's hand as it makes that bid. For hydrocarbons from natural gas and from petroleum refining are among the raw materials processed in such plants.

Petro-chemistry — the making of chemicals from hydrocarbons from gas and petroleum—is hardly old enough to vote. All its growth, practically speaking, has come in the last twenty years.

A study of sources of aliphatic chemicals, those which have an open-chain structure, shows that in 1925 grain

*Associate editor, Public Utilities Fortnightly.

fermentation provided 85 per cent of such chemicals, but output by this method had fallen off to 28 per cent by 1945. Wood distillation provided 13 per cent in 1925, 1 per cent in 1945; coal 1.9 per cent in 1925, 21 per cent in 1945. Natural gas and petroleum, which were sources of less than 1 per cent of such chemicals in 1925, provided 50 per cent in 1945.

And in the 15-year period from 1929 to 1944, the nation's production of synthetic organic chemicals, a large part of which are made from oil and gas hydrocarbons, increased 1,500 per cent from 650 pounds in 1929 to 10,600,000,000 in 1944.

These are nation-wide figures, but they apply to the Gulf coast as well as to other areas.

ANY exact determination of the natural gas value to the chemical industry, or the amount of gas used in the industry, is hard to reach. This is because hydrocarbons extracted from raw field natural gas, and those which are end products of petroleum refining, are similar and in some cases identical.

For this reason, most sources, such as government reports on chemical production, lump the two together. So the two are generally considered together as hydrocarbons here.

At the present, it appears that more petroleum refinery gases are used in chemistry than natural gas.

An official of a big Texas City, Texas, chemical plant, asked if he used natural gas as a raw material, replied:

"No. We could, but we find petroleum refinery gases more suitable at this time."

This is probably because in most processes, if natural gas is used, the hydrocarbons desired must be extracted by processing and converted in part to olefinic materials, whereas the same or similar hydrocarbons are sometimes available without so much trouble at oil refineries as by-products.

ON this point, the Bureau of Mines Information Circular 7347 says: ". . . ordinarily it may be assumed that a substance will not be made synthetically from naturally occurring raw materials if it can be obtained in sufficient quantities as a by-product from an active commercial process."

There are outstanding examples of use of natural gas hydrocarbons at present, and this use is increasing.

It is estimated by authoritative chemical industry trade journals that approximately a billion dollars was spent building and equipping chemical plants in Texas, Louisiana, Arkansas, and Oklahoma during the war.

Since the war, an estimated $300,000,000 has been invested in southwest chemical plants. Again, the Gulf coast figured prominently in the picture.

The above estimates are for all chemical plants. For southwest hydrocarbon chemical plants, it is estimated that between 1939 and 1945 some $652,000,000 was invested, including in round numbers $406,000,000 in Texas, $111,000,000 in Louisiana, $47,000,000 in Arkansas, and $88,000,000 in Oklahoma.

Since the war, the leading states of the four in investments in hydrocarbon chemical plants are Texas, with about $161,000,000, and Louisiana, with some $5,500,000. This does not include some new plants, plans for which have just been announced, but which have not been built.

Some Gulf Coast Chemical Plants

THERE follows a partial list of chemical plants on the Gulf coast using natural gas and petroleum hydrocarbons:

At Brownsville, Texas, on the south tip of the state, the multimillion dollar plant of Carthage Hydrocol, Inc., is being built. It is expected to start operating late in 1947 or in 1948.

First plant of its kind in the nation, it will use an American modification of the German Fischer-Tropsch process. With some 100,000,000 cubic feet of natural gas per day as a raw material, it is planned to make daily an estimated 10,000 barrels of gasoline, 2,000 barrels of Diesel oil, and 150 tons of crude alcohols in water solution.

If the process works according to plan, the gasoline will be made at costs competitive with gasoline made from petroleum. And the plant may result in establishment of a whole new series of industries.

Several companies are interested in this enterprise, including United Gas Corporation, one of the largest handlers of natural gas, which has made a substantial financial investment.

The Corpus Christi-Bishop, Texas, area has a number of chemical plants, including some which process hydrocarbons.

One is the Celanese Corporation of America's big Bishop plant, which makes acetaldehyde, formaldehyde, acetic acid, and other products from hydrocarbons, and is building a large research center to develop new products and improved processes. The Great Southern Corporation at Bishop makes butane and isobutane.

It is at another location, the Freeport-Velasco area 60 miles southwest of Houston, that perhaps the most astonishing concentration of chemical plants on the Gulf coast is found. Here are the great plants of the Dow Chemical Company and its affiliates. Natural gas, sea water, and salt are among the raw materials.

THE Dow plants' best-known product is possibly magnesium. But others are styrene, magnesium hydroxide, magnesium oxide, caustic soda, carbon tetrachloride, perchloric ethylene, ethylene glycol, diethylene glycol, and propylene glycol. The consuming public sees these products as light metals, plastics, soap, various kinds of synthetic rubber, cleaning fluids, solvents, antifreeze compounds, flavoring for foods, beverages, and tobacco, fire extinguisher fluid, and motor fuel ingredients.

The Houston Ship Channel area is another place where hydrocarbons en-

¶ "TRAVELERS *along the Gulf coast, passing by great ranches dotted with grazing cattle, lush green rice fields or farms, are startled to come upon grotesque, sprawling installations of pipe-festooned towers, groupings of tanks of all sizes and shapes, with smoke erupting from smokestacks, men at work, tank cars, and trucks moving. Such plants, rising from the low flat plains, make up the young but mighty chemical industry.*"

ter heavily into the chemical picture.

The Shell Chemical Company's enterprises are among the most interesting here. Shell's early chemical products included butadiene, isopropyl alcohol, and acetone.

Butadiene is a synthetic rubber ingredient; isopropyl alcohol is used in rubbing alcohol, brake fluids, antifreeze compounds, and in making pectin and phenolic laminates. Acetone is used in plastics and the cellulose acetate rayon industry.

Shell later began producing soil fumigants and a new type of plastic for decorative panels and for industrial applications. It began production of methyl ethyl ketone (MEK), used in lacquers, lacquer thinners, molded plastics, artificial leather, airplane dopes, dewaxing lubricating oils, and in printing and lithographing.

Rohm & Haas recently acquired a large site on the Ship Channel for a plant which probably will make polymethyl methacrylate raw materials.

GIANT plants along the Ship Channel make raw materials for synthetic rubber and turn out a substantial percentage of the nation's synthetic rubber. Among them are Humble Oil's massive plants and the General Tire & Rubber plant, all at Baytown, Sinclair Rubber Company, and Goodyear Rubber Company on the outskirts of Houston. Eastern States Petroleum Company, near by, makes butadiene.

Texas City, scene of the recent disastrous explosion of a ship laden with ammonium nitrate—which, incidentally, was not made on the Gulf coast—located about 40 miles southeast of Houston on Galveston bay, is a great chemical center.

In addition to such nonpetroleum installations as the nation's only tin plant, Texas City is the site of plants of the Monsanto Chemical Company, Carbide & Carbon Chemicals Corporation, Union Carbide & Carbon Corporation, and Southport Petroleum of Delaware, all of which process hydrocarbons.

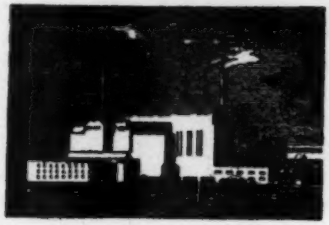
A formidable list of products comes from these plants, including ethylene amines, ethanol, butanol, vinylite, resins, polystyrene, styrene, formaldehyde ethylene, butadiene, butylene, acetone, ethyl ether, ethylene oxide, acetic acid, acetic anhydride, ethyl alcohol, ethylene glycol, and acetylene.

Looking eastward farther along the coast, construction is seen starting at Winnie, Texas, on McCarthy Chemical Company's plant to make unsaturated and aromatic hydrocarbons by processing natural gas.

Another noteworthy Texas gulf coast group is in the southeast corner of the state, in the Orange-Port Neches-Port Arthur-Beaumont area.

One of these is E. I. duPont de Nemours & Company's expanding Orange plant, which processes natural gas and other materials to make nylon salts and adipic acid, an important ingredient in the manufacture of nylon. Polythene, an industrial plastic, and other products are made or will be made when construction of the plant is complete.

SOON to go into operation near Port Arthur is the sprawling Jefferson Chemical Company plant which will produce ethylene oxide, ethylene glycol, and other glycols. The large B. F. Goodrich plant in this area produces synthetic rubber, and the Neches Butane Products Company at Port Neches makes butadiene.



Chemical Plants in the Southwest

"It is estimated by authoritative chemical industry trade journals that approximately a billion dollars was spent building and equipping chemical plants in Texas, Louisiana, Arkansas, and Oklahoma during the war. Since the war, an estimated $300,000,000 has been invested in southwest chemical plants."

Crossing the line into Louisiana, we find heavy chemical plant concentrations, including those processing hydrocarbons. Lake Charles is a city with several such plants.

Here are the extensive plants of Cities Service Company; Mathieson Alkali Works, Dow Chemical Company, and Firestone Tire & Rubber Company. Cities Service makes butadiene; Dow produces chemicals including styrene; Mathieson Alkali manufactures sodium nitrate; and Firestone, of course, is a synthetic rubber plant.

Outside the Gulf coast in its narrowest sense, but in the Gulf south area, are such hydrocarbon plants as those of the Atlas Oil & Refining Corporation, Shreveport, which produces butadiene, codimer, cumene, and other products; the big plant of Commercial Solvents Corporation at Monroe, which makes ammonia, methanol, and other products; and the Arkansas Fuel Company butadiene plant at Bossier City.

The Baton Rouge area is strongly represented. Near there are the Copolymer Corporation, making synthetic rubber; the Ethyl Corporation, producing hydrochloric acid, ethyl chloride, lead iodide, ethylene dichloride, metallic sodium, chlorine, and salt cake; the Standard Alcohol Company, manufacturing perbunan, butadiene, butyl rubber, ethyl alcohol, ethyl ether, isopropyl alcohol, isopropyl ether, isopentane, and isobutane.

The Gulf coast has no clearly defined boundaries and this is an incomplete list. New plants are announced frequently. An example is the recent announcement that Commercial Solvents Corporation plans a large Gulf coast hydrocarbons plant for processing natural gas and petroleum, the site as yet unannounced, the product 100,000 pounds of nitroparaffins daily when in full operation.

But the list may give an idea of the vast scope of the hydrocarbons-chemical industry in the region.

When the scope and growth of the

Gulf coast hydrocarbons chemical industry is studied a curious fact emerges.

It is odd but true that, although natural gas is of great importance to the chemical industry, the chemical industry is a very minor market for natural gas.

Chemicals provide only a small fraction of the total natural gas market. Experts differ on the exact size of the fraction, but all agree it is small.

"A fraction of one per cent," a June, 1947, staff report of a chemical magazine said.

"Even with our expanded use for chemical production from petroleum and natural gas, it may be seen that our total production for 1944 will consume less than one per cent by weight of our petroleum and natural gas produced this year," the Regulatory Practices Committee told the Interstate Oil Compact Commission in 1944.

In 1945, a staff report of a major oil company said: "Even with the very optimistic assumptions as to future expansion, the entire prospective demand for natural gas as a raw material for chemical manufacture (excluding carbon black) would represent less than 2 per cent of present gas consumption.

"Such a volume could have no appreciable effect on economics of the natural gas industry."

Natural Gas Reserves

WAR-BORN techniques and processes for making chemicals from hydrocarbons found in raw field natural gas and those which are refinery by-products of petroleum have raised new questions and have underlined the importance of the nation's natural gas supply.

Some persons and organizations, particularly economic groups who feel adversely affected by growing use of natural gas as an industrial fuel, such as the eastern coal interests, have advocated restriction of such gas use. There is agitation for conservation of the nation's natural gas supply for so-called "superior uses" such as conversion into valuable chemicals.

It is argued that gas, which can be used to make chemicals, is too good to burn under the boilers of industry. In view of the small amount of natural gas used in chemical manufacture and the rapidly increasing reserves despite mounting use as fuel, these "superior use" advocates are really arguing for a virtual abandonment of the whole natural gas industry and scrapping of its huge investment in production, transmission, and distribution facilities.

While production and use of natural gas increase year by year, the volume of known gas reserves increases at a far greater rate. Among the latest reports is that of the American Gas Association committee on gas reserves, as of December 31, 1946.

This shows that 1946 began with an estimated known reserve of 148 trillion cubic feet, and ended with an estimated 160 trillion cubic feet, or a gain of 12 trillion cubic feet.

This came about as follows: During the year, revisions, extensions, and discoveries added 17 trillion cubic feet, production was estimated at 5 trillion cubic feet, and this 5 deducted from 17 leaves the 12 trillion cubic feet net addition.

The 160 trillion cubic feet is an all-time high. But more important than the annual use and discovery of gas is the trend over a several year period.

EVERY year for many, many years, while the use of natural gas has increased, the size of the known reserves increased at a much more rapid rate.

Too, the trend in oil and gas well drilling is toward deeper and deeper wells. And, as commonly known in the industry, deeper drilling is producing a larger ratio of natural gas to petroleum than did the shallower drilling of the past.

So in view of these significant facts; in view of improving techniques and processes making for interchangeability of natural gas, petroleum, and coal as sources of hydrocarbons for motor fuel, chemicals, and fuel gas; in view of research into atomic energy as a source of power, it becomes harder and harder to justify the position that natural gas is too good for industrial fuel use.

Natural gas is a splendid source of raw materials for chemicals. But the natural gas industry must remember that if natural gas production were distributed evenly throughout the year, two or three days' production would be enough to supply all the market for gas which exists in the chemical industry. The other 362 or 363 days, the industry must look elsewhere for its markets.

WITH this growing and comparatively remunerative — in price paid per unit of production—way of selling hydrocarbons from petroleum and natural gas, it might seem natural that oil and gas men would plunge into the chemistry field, at least as a side line.

A good many have done so. Several oil companies either process hydrocarbons into intermediary chemical raw materials, such as butadiene or styrene, or have affiliates which do so. Some are the Humble Oil & Refining Company, Sinclair Refining Company, Shell Oil Company, Cities Service Company, Shamrock Oil & Gas Company, Southport Petroleum Company of Delaware, Standard Oil Company of New Jersey, Standard Oil Company of California, Barnsdall Oil Company, Lion Oil Refining Company, McCarthy Oil & Gas Corporation.

A few, such as Shell, have extensive, large-scale chemical operations.

Some of the reasons why more oil companies have not gone into the chemical business in a large way may be found in a statement by G. G. Oberfell, vice president in charge of research and development, Phillips Petroleum Company.

"Manufacture of chemicals from oil and natural gas is certain to increase," he said, "and the petroleum companies will undoubtedly place more and more emphasis on this activity.

"However, the manufacture of chemicals, compared with the manufacture of fuels and lubricants, calls for different type of operations characterized in particular by small quantities, higher investments, higher costs, higher research budgets, a higher degree of technical skill, and higher obsolescence of process and production; that is, shorter life of process and product.

"Considering these differences, the petroleum refiner may find it more expedient to manufacture raw materials for the chemical companies than to manufacture the finished products, a procedure already being followed to a great extent."

Washington and the Utilities

Swinging the Kilowatt Circuit

WHEN Senator Taft (Republican, Ohio), on his recent political-or-what-is-it swing around the West, came out flat-footed for more reclamation, it may have mildly surprised some eastern conservatives. But the Ohio Senator was simply echoing what a good many Republican and Democratic politicians alike are saying will be necessary to get votes in the West next year. Of course, Senator Taft hedged a bit when he said that reclamation work was something that is going to take a lot of time and that we should go light on it during periods of high employment and material shortages so as to save a backlog of public works for hard times, unemployment, and surplus materials. Just the same, he did not hesitate to take a back-handed slap at his own party leadership in the House of Representatives when he said the House probably had cut too deeply on reclamation funds, but the Senate had put back about what was needed.

Federal reclamation-power projects in the Northwest proved to be a pretty popular touring circuit for itinerant Congressmen this summer. Few of the Congressmen who went West, for enlightenment about how the taxpayers' money is being spent, came away without an earful from a half-dozen different sources on the importance of keeping such work pushing right along with additional appropriations. Few also failed to touch all the bases once they came within the sphere of influence of the official and unofficial guides.

JUST the same, zealots for Northwest development found time to meet in convention and regret that more missionary work could not be done on the "Congressman from Pennsylvania." No particular "Congressman from Pennsylvania" was intended. That was simply a symbolical term used to denote eastern Representatives who remain unsympathetic or at least skeptical about the need for continuing Federal spending in the Northwest in the manner to which the local citizenry has become accustomed.

It was at a meeting of the Columbia Basin Commission, held in Walla Walla, Washington, that Art Garton, director of the state department of conservation and development and chairman of the basin commission, emphasized the necessity for bearing down on the "Congressman from Pennsylvania." Garton also emphasized the necessity for everybody in the same camp bearing down at once and in the same manner—in other words, using a "coördinated approach" with the same facts and figures to impress Congress. He brought out that legislators can be convinced of the need for further Federal expenditures in the West by showing them how raw materials from this territory can be converted into finished materials in the East and Middle West, providing profitable employment among their own constituents.

B. M. Huntington, Walla Walla, director of the Inland Empire Waterways Association, reported on progress of McNary dam. He mentioned present plans to ask Congress for $40,000,000 for that project for the 1948-1949 fiscal year.

It was generally agreed that it would take concerted action from all interests in the Northwest to secure this amount of money as well as necessary appropriations to continue the Columbia basin development, which is faced with a necessity to shut down its work this winter

because of a lack of funds from Congress.

Former United States Senator Dill brought out that total costs to date for Bonneville and Grand Coulee dams were $280,000,000, but claimed that in the last seven years returns to the Federal Treasury from war industries had amounted to more than $200,000,000 and with other benefits to the Federal government these two projects had actually returned $300,000,000 because of low-cost power, he said.

SOME Congressmen, however, were criticized as apparently being beyond salvation as far as conversion to the cause of bigger and better reclamation. Representative Horan (Republican, Washington) charged that Iowa's Congressman, Ben Jensen (Republican) "wields more power over the development of the Columbia river and its tributaries than the governors of the four Northwest states." Horan made his statement at an informal gathering of forty-five representatives of public utility districts, labor unions, REA co-ops, and farmers who gathered at Davenport to formulate a "statement of policy," to be submitted before a congressional subcommittee investigating Columbia basin expenditures October 2nd.

Congressman Horan hit out at "basin disunity" in an effort to get all the boys together on the same kind of a story before the subcommittee of the Appropriations Committee arrived on the scene early in October to make its investigation for future basin allotments. Horan said these Congressmen have the power but do not have the right attitude, because they have not been given the "proper information."

The House Appropriations subcommittee was due in Portland, Oregon, on October 2nd for a hearing on supplementary appropriations of $10,750,000 for the Columbia basin for the present fiscal year. (This would be money available before June 30, 1948, in addition to the $21,500,000 already allocated basin projects.) Reclamation Commissioner Straus will be on hand for this hearing. Oregon's Republican Senator Cordon stated last month that $30,000,000 yearly will be needed for the next six years to complete McNary dam. Army Engineers are reported ready to ask for $48,000,000 for this project in fiscal year 1949.

Also, Interior officials were slated to accompany the committee at every turn. When Assistant Interior Secretary Warne left the House group in Montana, Assistant Interior Secretary Davidson was scheduled to join it. Meanwhile, "emergency construction" of 20 power transmission projects of the Bonneville Power Administration was started last month. Expenses of the work ($769,000) not covered under existing appropriations, will come from a special Interior "emergency" fund. Most of the lines will connect with public utility districts and REA coöperatives.

Power Sale at the Bus Bar

SPEAKING of Representative Jensen and his influence on the House Appropriations subcommittee for Interior brings to mind an interesting statement recently made by Mike Bennett, president of the Arizona Electric Coöperative Association. Bennett is up in arms over the threatened duplication of his group's activity by either the Arizona Power Authority or the U. S. Reclamation Bureau. Bennett said he had been advised by Representative Jensen that technicians and engineers of the Bureau of Reclamation now are in the field pertaining to a "policy and program that he and his colleagues will introduce into the next Congress."

"This policy, he said, is for the sale of power at bus bar near the point of generation. He also stated, and we quote, 'that where the states have created their own agencies to handle power, the Federal government should not go into those states with reclamation lines.' "

FPC Still Flirting with End Use

WASHINGTON observers were inclined to believe that the Federal

Power Commission would approve the Big and Little Inch pipe-line certificate for Texas Eastern Transmission Corporation in good time for the pipe-line company to complete its financial arrangements. While this would dispose of the objections which coal, labor, and rival fuel interests generally have been making to the introduction of natural gas in Philadelphia and other eastern seaboard areas, it still leaves up in the air the very pertinent question of deciding between different market areas and different consumer demands during a period of short supply. Of course, it is not the supply which is actually short as much as the capacity of existing pipe lines to bring sufficient supply to the areas to be served.

Needless to say, such a shortage situation, plus rivalry in some areas such as Detroit between different pipe-line interests, is a made-to-order condition for reviving the old issue of controlling the "end use" as between so-called inferior and superior consumer consumption.

Thus, FPC finds itself with the duty of allocating supply thrust upon it, without lifting a finger or reaching an inch. In the recent Michigan Consolidated and Panhandle Eastern cases, involving rivalry over the supply of natural gas in the Detroit area, it was the court and not the commission which handed down an order requiring the FPC to go ahead and allocate gas deliveries.

During the hearings on the disposition of Big and Little Inch gas, members of the commission began to study carefully the extent of their jurisdiction over similar allocation with relation to customer use. The close attention which several members of the FPC are giving to these allocation hearings raises the question of whether the allocation of gas supply might not eventually result in the control of the "end use," at least during a temporary period of short supply. And, of course, temporary jurisdiction always has had a way of growing or at least presaging eventual full-time jurisdiction.

In any event, FPC may be expected to review the question of where allocation ends and end use begins. Under the statute, the commission is not supposed to control the disposition of gas once it reaches the terminal market. But it may be called upon to arbitrate conflicting claims of industry, industrial consumers, and other customers for short supplies of natural gas in default of any other regulatory authority—just as a shortage of water supply during the summer months sometimes puts it up to local police to stop people from sprinkling their lawns.

The FPC already has indicated the extent to which it is prepared to go into control of production and gathering at the supply end of the pipe line, as evidenced by its recently amended rule on the subject. If the FPC does decide to start regulating the allocation of gas supply among the various types of consumer demand at the distribution end of the pipe line, it may be a burr under the saddle of the Rizley Bill now marking time in a Senate committee pigeonhole following House passage.

Duty to Serve during Shortage

The shortage of supply in the gas and telephone utility firms has given rise to some deep thinking as to what the regulatory authorities can do. Most state and Federal regulatory statutes give the commissions power to require utilities under their control to render adequate service. But such power can be exercised only by issuing paper orders. And paper orders, even if they were accompanied by fines, or penalties, could not magically produce switchboards, pipe lines, and other plant material and equipment, shortages of which are the real basis of the present utility supply difficulties.

Last year the Georgia Public Service Commission cited most of the telephone companies in that state to show cause why service should not be improved and the commission was pretty generally informed that the reason was the failure of the companies to obtain delivery of necessary plant replacement and switching units. After some negotiations, several penalty orders which the Georgia

commission had tentatively entered, were withdrawn. Still more recently a similar situation has flared up in Florida.

As for gas service, the same Georgia commission recently considered penalties against a gas company for failure to provide uninterruptible gas service to gas consumers in Atlanta, Macon, and Rome. The gas company simply came in and attributed its difficulty to the failure of its wholesale supply company to deliver an adequate gas supply. Again the Georgia commission was confronted with the practical question of what good it would do to fine a retailer because he was not able to buy enough supply from his wholesaler.

Out in Kentucky the state commission had to retract an order because of shortage of supply being experienced by three of the major gas companies in that state. The gas companies wanted permission to refuse to take on any additional space-heating customers. The commission originally said that it was the utilities' obligation to serve all customers ready, willing, and able to pay. And a lower state court was inclined to agree. But the commission later decided to permit the three gas companies to restrict new residential space heating with gas.

UNDER ordinary normal circumstances, the regulatory commission might take the position that a utility's failure to render adequate service was its own fault since it indicated unwillingness to make the necessary investment in new plant and other facilities required to bring the service up to par. That is probably the theoretical basis for the service penalty provisions in most state regulatory laws today. But such a theory could hardly apply under prevailing circumstances where the utility companies would be only too willing to buy the necessary additional facilities if they could get their hands on them.

Rural Power Program Cut

LACK of funds has "drastically" curtailed the nation's rural electrification program, Clyde L. Ellis, executive manager of the National Rural Electric Coöperative Association, said in Des Moines last month. Ellis made the statement in an address before the sixth annual convention of the Iowa association.

"Farm families will be delayed months and even years in getting the electrification they want and need," he said.

In giving the background of the situation, Ellis said Congress last year appropriated $225,000,000 to the Rural Electrification Administration for the fiscal year ended June 30, 1948. But at the time of the appropriation, "the REA already had applications from coöperatives totaling $278,000,000 for additional systems," Ellis added.

He congratulated Iowa delegates on their support of an additional $25,000,000 appropriation. Though defeated in the House of Representatives, Ellis said not a single Iowa Congressman voted against it.

Another problem, particularly acute in Iowa, is the need for wholesale power.

"The power just isn't to be had in Iowa," Ellis stated. "It looks as if the coöperatives will have to expand their own generating plants."

The eventual development of the Missouri river power system may ease the condition, but such a move still remains a long way in the future, he added.

National Reclamation Laws

PASSAGE of legislation to modernize and liberalize national reclamation laws to remove obsolete and contradictory features of existing legislation was urged last month by Don McBride of Washington, secretary-manager of the National Reclamation Association, in an address to the Arizona State Reclamation Association at Phoenix.

The state association adopted a resolution supporting the Rockwell Bill now in Congress. This bill is designed to recodify the various reclamation laws as they now exist, and McBride called this action "of vital interest to you."

"A bill is ready for action at the next session of Congress," McBride reported.

Exchange Calls And Gossip

Labor Bills Due in 1948 Congress

MINIMUM wage boosts and other revisions of the Fair Labor Standards Act appear to be in the congressional cards for next year. A quick check of labor committeemen on Capitol Hill turns up the almost definite conclusion that some legislation along this line will be passed by the second session of the 80th Congress. Action leading to such passage will start in Washington in earnest long before the turn of the year. In fact, a House Education and Labor subcommittee is all set to work on an amendatory bill late this month.

Led by Representative Samuel K. McConnell, Republican of Pennsylvania, the 9-man subcommittee hopes to open hearings around October 20th on phases of the Fair Labor Standards Act other than the minimum wage. This subject already has been rather thoroughly explored by this same group at hearings earlier this year on a bill (HR 3886) by Representative Landis, Republican of Indiana. Using these hearings as a starting point, the group will go on from there and prepare an over-all measure for presentation to the next regular session of Congress.

The hearings, which will probably last a month or so, may touch on phases of vital interest to independent telephone men. For one thing, they will go into the question of wider coverage of the act's provisions. Whether the law's present exemption of employees in small telephone exchanges having less than 500 stations will be altered is a point due for discussion.

THERE appears to be more steam behind these present efforts to revise the Fair Labor Standards Act than ever before in Congress. For one thing, majority leaders are anxious to show a constructive labor record during the pre-campaign sessions in 1948. Since one of the major pieces of labor legislation to filter through Congress in 1947 was the Taft-Hartley Act, which labor leaders have chosen to regard as most offensive, top congressional thinkers want to do a little fence mending. Senator Taft recently threw his support behind a hike in pay for those in the lowest wage brackets. This is regarded as tantamount to assurance that his Senate Labor Committee will process the House legislation as promptly as it can do so. Backstage, committeemen hint that the new wage floor will be 60-70 cents per hour, a compromise figure.

On the Senate side, there also will be more drive behind Senator Ives' bill for a Fair Employment Practices Act and Senator Taft's national health measure. The chances of both these bills are good in the Senate, cloudy in the House, with the battles over them certain to cross party lines. There seems little likelihood of amending the Taft-Hartley Act during 1948, although strenuous efforts to repeal it or water it down will be initiated. General congressional attitude on Taft-Hartley is "let it alone for a while and see how it works." Senator Ball's joint Committee on Labor-Management Relations will keep an eye on the law's operation, and probably will be the principal congressional force in advocating this "wait and see" policy. Of course, the real determining factor in handling, or manhandling, the Taft-Hartley Act will be what labor will do next spring at contract time, with or without the aid of the new law. At present, Senator Ball and

his staff are convinced that all organized labor will eventually fall into line at the door of the National Labor Relations Board.

Texas Leads Parade to Rural Telephony

WHATEVER may be said in attack or defense of the great and sovereign state of Texas, it can never be said that its citizens lack wills of their own. They graciously threw in their lot with the other 47 states and the District of Columbia when an unannounced air raid on Pearl Harbor precipitated an armed conflict in 1941. Texas contributed considerable man power and thousands of her acres to preparing those forces for battle. When the tall tales of the Lone Star state had been spread by her disciples to the four corners of the earth, it became a truism to opine that as Texas went, so went the Texans.

So it comes as somewhat of a shock to find that one medium-sized rural electric coöperative in the town of Bellville, Texas, had the temerity to run counter to a stand of its parent state organization, the Texas Power Reserve, on the rather important matter of rural telephony. For this co-op, specifically the San Bernard Electric Coöperative, Inc., has signed the first approved contract between an REA co-op and a privately owned telephone company for farm telephone service. This particular move is so startling because the Texas Power Reserve, made up of some 95 per cent of all Texas electric co-ops, had recently decided in solemn conclave that it would look down its nose at any telephone contract unless it was made as part of a statewide integrated program.

AT the time this decision was reached, there were many who said it was rather silly to hold up piecemeal progress in farm telephony while somebody wrestled with a huge headache like a statewide program. It was pointed out that the Bell system and the independent companies in Texas already had a well-staked-out network of interconnecting telephone lines, into which the relatively small co-op systems could be fitted neatly. There were even some who saw in the Reserve's action a veiled attempt to slow down rural telephone expansion in the hope of forcing Federal action in the field. It seems fairly obvious now that the Reserve decision should not be taken too seriously.

The San Bernard co-op, possibly with one eye on the map, evidently decided that Texas was too big for any such coördinated development. It took the plunge without the slightest by-your-leave from the state Reserve nabobs. It put pen to the standard type of telephone contract worked out earlier this year by the Bell system and the Rural Electrification Administration. This contract is with Southwestern Bell Telephone Company, and is for service over the "carrier" type telephone, which means that by means of an electronic device the telephone messages will be carried over the same wires now transporting power to co-op members. The co-op has 614 miles of power lines and serves 1,404 customers.

The contract's terms deal mostly with what the company will pay to the co-op for pole rentals and line services. Charges of $1 per year for each pole used in telephoning (in the carrier system, devices are attached to approximately four poles in each mile of line), plus flat installation, maintenance, and removal fees, will be paid to the co-op by Southwestern Bell. All work on the lines will be done by co-op employees. The pact will be in effect for a minimum of five years, during which adjustments in these charges may be asked for by either party in January of each year, and may be agreed upon by joint review. There is nothing in the contract at all about what rates the company will charge the co-op subscribers for telephone service. REA evidently feels that it could not legally accept or withhold approval of such rates, so it kept out of it altogether. What REA does like about the contract, and the six or more others which followed it, is that it offers an opportunity

for economy in both the electric and telephone facilities which could be shared by both the co-ops and the companies, and eventually passed on to the consumers. It also means the opening of a real drive for expansion of the rural telephone industry.

Labor Heads Gather

TOP-LEVEL strategy on organizing the crazy-quilt pattern of telephone unions into that much talked about "one national union" was again top subject at the recent meeting of the executive board of the Communications Workers of America (CWA). The thirteen key members of the revitalized National Federation of Telephone Workers spent two weeks in a huddle in Washington, labored long and brought forth only a mouse of information, but the real story of what was decided will be revealed slowly in the actions of CWA over the next six months.

Biggest news, of course, was CWA's decision to set up a division in Bell system's Long Lines Department. This marked the first organized frontal attack on the CIO's Telephone Workers Organizing Committee, which is just about ready (October 10th) to assume bargaining authority for the 22,000 Long Lines workers. CWA will set up its own locals alongside the CIO units, and will attempt openly to wean workers away from CIO. Evidently, CWA feels that there is enough dissatisfaction in union ranks to give the big independent group a fighting chance to muscle back into control. Long Lines was once a stronghold of CWA strength, and swung to CIO when John J. Moran, former vice president of CWA, bolted its ranks in May and took his union with him.

Even if the CIO wins bargaining rights in the Long Lines Department, CWA will go all-out in an organizing drive timed to mature with the next union contract period in the spring of 1948. The same tactics will be used by CWA in seeking to recapture the Association of Communications Equipment Workers (ACEW), the nation-wide Western Electric installers union. A CWA division will be set up, locals will be formed and nursed along until strong enough to demand bargaining showdowns with rival unions. CWA also has announced it will experiment further with organizing workers employed by individual contractors doing work for telephone companies. This new technique is said to have worked well in Indiana, where employees of a pole line construction contractor were successfully recruited.

THE executive board also is reported to have laid the groundwork and set some of its long-range targets for bargaining with Bell system next spring. As a preliminary step, President Joseph Beirne asked the administration to "take positive and concrete steps" to bring about a sharp reduction in prices. Beirne said that the Bureau of Labor Statistics consumers' price index had risen 59.3 per cent from 1939 to 1947, while telephone wages had risen only 37.5 per cent during the same period. This would leave the workers, according to Beirne, some 22 per cent worse off than in 1939. An easily arrived at conclusion would be that CWA will seek a wage increase of at least this figure—22 per cent. Last spring the old NFTW asked for a 30 per cent boost, struck the Bell system for six weeks, and ended up with a 5-10 per cent hike in wages. Presumably the CWA chief was setting the stage to ask for a substantial wage increase if prices did not drop to meet telephone workers' purchasing power.

Other high spots of the fortnight's session were: what to do about displacement of union workers when systems are converted to dial operation; how much jurisdiction and power should be vested in the various echelons of union organization, especially in the new post of CWA regional director; how to proceed in jurisdictional disputes under the terms of the Taft-Hartley Act, which now covers nearly all CWA units; and half a dozen other questions in a somewhat knotty state. The conclusions reached, if any, remained top secret.

Financial News and Comment

By OWEN ELY

Josephthal & Co. Appraises the Natural Gas Industry

R. W. Miller of Josephthal & Co. has prepared a comprehensive "Review and Appraisal" of the natural gas industry. He concludes that "heavy current demands are already exceeding delivery capacity and, in view of the broadening use of natural gas as a fuel due to low cost and ease of handling and its growing application in chemical synthesis, the prospects for the companies in all phases of the industry appear unusually favorable."

Total estimated reserves of natural gas, the study points out, now amount to 160 trillion cubic feet. Net production last year was 4.9 trillion cubic feet. This indicated a reserve good for thirty-three years at the current rate of output. Despite the rapidly increasing use of gas, discovery of new reserves has greatly exceeded the depletion of the older fields. In 1919 reserves were estimated at only 15 trillions, but in 1938 the figure had increased to 66 trillions, and in the past decade it has more than doubled. (The increase last year was 8 per cent.) Of course all estimates are highly approximate and sometimes figures taken from different sources vary widely. Even should the present supply become depleted, increased prices for gas in some areas would permit drilling of wells to deeper levels which should prolong the life of the industry. Moreover, processing of gas condensate and recovery of casing-head gas in the oil fields (formerly wasted) will substantially increase production.

Production statistics for the industry vary considerably and require a little expert knowledge. Mr. Miller gives total production in 1945 as 5.9 trillion cubic feet. Of this amount about 1.1 was returned to the ground for storage, leaving 4.8 trillions "net production." Losses and waste accounted for about .9 trillion, leaving "marketed production" of 3.9. "Field use" then accounted for about .9, leaving "net marketed production" of 3.0 trillions. But this figure compares with only 2.2 trillions "annual sales" in our own table on page 516. Just why there should be such a large discrepancy is not clear. But even the larger figures just quoted are considered to be on the low side, since they do not include all the waste gas (such as the numerous "flares"), together with the output of many small or incidental producers.

(It is obvious that the statistics of the industry need some clarification, and we suggest that the American Gas Association might well collaborate with the various government agencies in an effort to compile a statistical history of the industry, indicating methods of compilation and the possible margin of error. At present a student of the industry can well become lost in a statistical maze.)

During the decade ended 1945 the net production of natural gas, according to the Josephthal study, doubled in amount. (During the same period production of electricity, including public power, also doubled.) Industrial consumption now accounts for about 79 per cent of natural gas sales, residential 15 per cent, and commercial 6 per cent. Residential usage, which has recently increased somewhat faster than other uses, has been aided by conversion to straight natural gas in many large communities and to use of mixed gas in other sections. Besides developing cooking and refrigera-

tion loads, Mr. Miller points out, the change to natural gas or mixed gas makes for expanded use for house heating, small space heating, automatic water heating, and air conditioning. Home incinerators and other new devices also have been introduced. Some growing commercial uses are for baking, and heating and air conditioning in stores and amusement places.

THE biggest users of natural gas, however, are usually located near the source and thus obtain gas very cheaply, as compared with consumers who get it by pipe line. As noted above in the analysis of the 1945 statistics, nearly one-quarter of "net production" is used in the field itself for production, processing, and transmission. The oil refining and carbon black industries are the biggest single customers and the steady growth of the oil industry thus has been of considerable aid to the natural gas industry. Consumption by carbon black is more irregular, however. About three-quarters of carbon black is used in the rubber industry. Synthetic rubber requires twice as much as natural rubber, which created big wartime demands for carbon black. Since we are now returning to greater use of natural rubber, consumption of gas by the carbon black industry appears likely to decline sharply. (However, this should not have any disturbing effect on the revenues of producing gas companies, since the price of gas for carbon black is only a small fraction of the price for most other uses.)

Electric utilities also use a substantial amount of natural gas as fuel. Industries requiring controllable heat, such as chemicals, glass, ceramics, paper, plastics, steel, etc., are making increased use of natural gas. Many industrial companies are now using natural gas on an interruptible supply basis, using other fuels when necessary. Such use of gas is expected to expand as new pipe-line facilities make it available in fresh areas.

Josephthal & Co. points out that gasoline and various by-products may soon be produced from natural gas. The first commercial operation is at the $15,000,000 plant of Carthage Hydrocol, Inc., at Brownsville, Texas. Another plant will be located near the Hugoton field. It is claimed on the basis of experimental work that synthetic gasoline can be made from natural gas at about the same cost as by refining oil.

NATURAL gas should continue to be a growing industry for some time to come, since the construction of new pipe lines will greatly widen the market. Mr. Miller sketches the history of pipe-line development, as well as the devices of "interruptible supply" and underground storage of gas in depleted fields, which have greatly helped the industry to stabilize sales and thus facilitate the financing of pipe-line facilities. In recent years the industry has benefited by its very low payroll costs; some of the pipeline companies in 1946 paid out only about one-tenth of operating revenues for labor.

The study lists the present and proposed capacities of the major pipe lines, indicating the percentage of planned expansion. Texas Eastern expects to increase its capacity 210 per cent, El Paso 190 per cent, Tennessee Gas Transmission 107 per cent, Panhandle 45 per cent, etc. Four huge new projects are planned at an estimated outlay of several hundred millions of dollars.

The subjects of local regulation, conservation, and taxation also are discussed, including the attempt in Oklahoma to fix the minimum price of gas at the wellhead. The scope of the regulatory powers of the Federal Power Commission and its standards of fair return and "prudent investment" plant cost are described, together with recent proposed congressional legislation.

Natural Gas Company Cost Units

THE Federal Power Commission has recently issued a 39-page study under the above title. The data are based on 1945 returns from 87 class A and B natural gas companies (except for omis-

sions where figures were inadequate).

Plant investment units and operating expense units are developed with respect to production, transmission, distribution, etc. Property units include producing gas wells, field lines, compressor stations, and measuring and regulating stations. Expense units are also developed for supervision and engineering with respect to both production and transmission, distribution expenses, customer accounting and collecting expenses, sales promotion, and general expenses. No figures for individual companies are presented, the idea being merely to set up averages to serve as yardsticks which the individual companies can compare with their own results. Some of the averages which may be of special interest are as follows:

Transmission line investment, exclusive of land and land rights, ranges all the way from $1,943 a mile to $29,442, with the average figure a little above $10,000. Transmission compression stations in 1945-6 cost about $190 per horsepower. No average figure was worked out for the measuring and regulating stations, but these make up less than 2 per cent of the investment. Land rights are about 1 to 3 per cent of the investment in transmission plant. The investment in field pipe lines exclusive of land varies widely, depending on the diameter of pipe, etc., but the general average works out at $4,147 per mile.

Field compressor stations cost about $90 per horsepower. The distribution plant investment costs an average of about $91 per customer. The cost of general plant investment varies considerably, the median figure being about 4.8 per cent of total plant cost.

TURNING to annual operating expense units, transmission expense averages about $140 per mile of line ($75 for operation and $65 for maintenance). Compressor station operating expenses appear to average close to $20 per horsepower, but, as with other items, the figures vary widely, depending upon the size of the station and the average annual hours of operation.

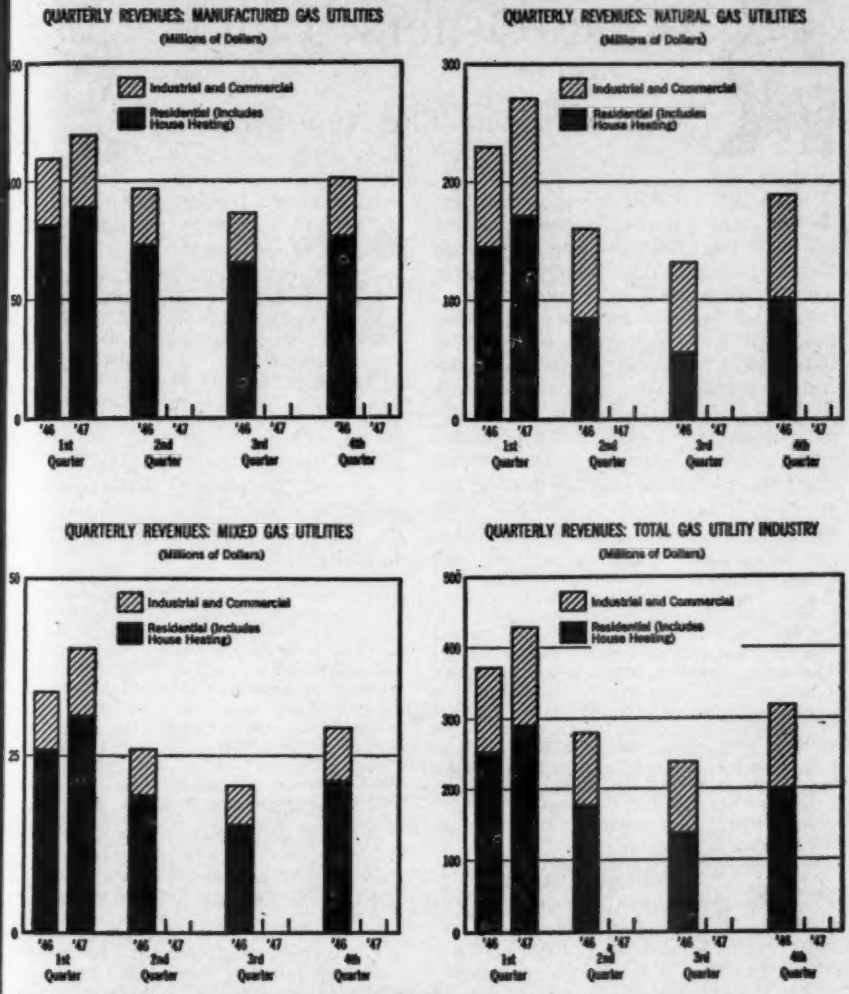
Supervising and engineering expenses for transmission are calculated as a percentage of total transmission expense, with an average of 9 per cent. Annual operating expenses averaged $159 per producing gas well. Field line operating expenses averaged $64 per mile of line.

18-YEAR RECORD OF THE GAS INDUSTRY

(Source of data: Moody's Service)

	Manufactured and Mixed Gas				*Natural Gas*			
Years	MCF	*Millions Rev.*	*Cust.*	*Rev. Per* MCF	MCF	*Millions Rev.*	*Cust.*	*Rev. Per* MCF
1946	562	$503	11.4	$ .95*	2,185	$709	9.5	$ .32
1945	536	477	11.2	.94*	2,179	682	9.1	.31
1944	476	431	10.5	.91	2,157	677	9.3	.31
1943	459	418	10.3	.91	2,022	649	9.0	.32
1942	425	399	10.2	.94	1,787	596	8.8	.33
1941	390	375	10.1	.96	1,625	540	8.5	.33
1940	375	366	9.8	.98	1,459	506	8.2	.35
1939	348	351	9.6	1.01	1,346	464	7.9	.35
1938	335	344	9.5	1.03	1,227	430	7.6	.35
1937	334	344	9.5	1.03	1,332	458	7.4	.34
1936	326	342	9.3	1.05	1,233	426	7.2	.35
1935	317	338	9.1	1.08	1,068	390	7.0	.37
1934	312	342	9.0	1.10	990	361	6.7	.36
1933	302	341	8.8	1.13	872	341	6.5	.39
1932	317	369	8.9	1.16	845	356	6.4	.42
1931	345	389	9.3	1.13	920	380	6.6	.41
1930	355	398	9.4	1.12	1,002	400	6.5	.40
1929	351	394	9.4	1.12	1,003	391	6.2	.39

*Statistics for 1945-6 are not exactly comparable with previous years, since mixed gas companies are not included.



"Report of Utility Gas Sales," American Gas Association

Supervision and engineering expenses on the production end averaged 10.1 per cent of all expenses in this department. Distribution expenses amounted to $4.09 per customer per annum, and accounting and collecting expenses about $2.52. Sales promotion expense accounted for only 1.13 per cent of revenues for all companies, while administrative and general expenses averaged between 7 and 8 per cent. The study would be of greater interest to busy executives if the principal averages (including the above) were not buried in a maze of detail; in other words, a statistical summary would improve its value.

What Others Think

Synthetic Fuels-The New Frontier?

IN a recent brochure on the fuel situation and research in production of synthetic fuels from coal, the Pittsburgh Consolidation Coal Company delineates the relative positions of various fuels.

General theme of the pamphlet is that coal is not to be replaced by newer fuels, but is to become the source of supplemental supply. The research sponsors find the fact that the nation is currently dependent upon coal to such a great extent, at a time when there has been increasing demand for natural gas and petroleum, "all the more significant." They state:

> Because both natural gas and petroleum are at present being produced at rates approaching an economic optimum, there seems little possibility that either can replace coal for a very much larger share of the nation's future energy requirements unless foreign oil is brought in at prices below the present market. While it is believed that natural gas and petroleum will continue to be produced in increasing volume, their production is likely to be accompanied by increases in cost. . . . The coal industry is now in the fortunate position of having long-term reserves and can face the prospect of maintaining or perhaps even cutting production costs over the years.

The U. S. Bureau of Mines estimates that coal and lignite represent 98.8 per cent of this country's mineral fuel energy reserve, excluding atomic power elements. Established petroleum reserves are said to represent .2 per cent, natural gas .2 per cent, and oil shale .8 per cent, according to the same source.

IN speaking of the future plans of the electric utility industry and the expected increase in consumption, the brochure states: "Coal is being and will be called upon in the future as a fuel for most of this increase in the use of electricity."

At this point the focus of attention is shifted to the relative position of gas. It says:

> Everyone is familiar with the phenomenal growth of the use of gas by industry and by the householder in recent years. This growth has been steady in those areas served by manufactured gas . . . and more rapid in those areas served by natural gas.

With substantial reserves of natural gas available for production, two factors tend to limit large-scale expansion. The problem of the moment is the transmission of this fuel to market, the second is the unbalance of seasonal demand for natural gas, or

> . . . The difficulty experienced by the industry to effect a better balance between the periods of extreme low and peak demand. While industry can take a steady volume throughout the year, the peak requirements for house heating, a market which represents about 50 per cent of the total national consumption of natural gas, occur during only about three months of the year. In this comparatively short period the industry is required to furnish approximately 75 per cent of the full year's needs of this market. . . .
>
> Some relief in the load problem has come from additional production from old-style water-gas sets, from oil gas, the use of liquefied propane and butane, together with the use of old oil and gas wells for storage purposes.
>
> . . . It is believed that gas from coal such as will be produced by means of a coal refinery (described below) may assist in this solution.

Shifting the scene to the oil industry the pamphlet continues:

> Prior to the recent war, this country had an excess annual capacity of about a half-billion barrels of petroleum. . . . Today with an annual peacetime consumption of 1,700,000,000 barrels, the nation is up against its petroleum capacity, with no such safety margin for emergencies. . . . The total proved reserves of petroleum deposits are only 12.3 times the annual consumption and the cost

of finding and developing new fields are climbing steadily. Since the present consumption of petroleum is steadily exhausting the low-cost reserves, the oil industry is itself trying to find new means of augmenting our supplies of liquid fuels.

THE brochure points up its case by referring to an item in the March issue of *The Lamp*, a Standard Oil Company (New Jersey) publication, and quotes the following:

> Research into the manufacture of synthetic gasoline and Diesel fuel from sources other than petroleum was recommended recently as one of the basic elements of our national petroleum policy by the Senate subcommittee which has been investigating American petroleum resources.

Cited in support is the success of pilot plants such as that at Baton Rouge, Louisiana, leading to the possibility of commercial plants for the production of synthetic gasoline from natural gas. The conclusion drawn therefrom is that "domestic petroleum cannot be regarded as presenting any long-range threat to, or replacement of, coal."

It is stated that there is nothing new in the idea of making liquid fuel from coal. Various experiences in this date from the middle Nineteenth Century. Experiments in the hydrogenation of coal in Germany date back to 1910 or so. German and British scientists between world wars made important contributions to the science of producing gasoline from coal. These processes to date, it is said, cannot compete with the production of gasoline from petroleum. In answer to the query of when it will be necessary and economically sound to augment gasoline supply by conversion from coal, it is said that

> Recent research and engineering developments now make it appear there is reasonable promise that within a few years synthetic gasoline will be produced from coal at a cost very close to that from petroleum or natural gas.

The sponsors of the pamphlet, working with the Standard Oil Development Company (research organization of Standard Oil Company of New Jersey), and with outside laboratories, have completed an "exploratory program of experiment and engineering evaluation." It is added that this had produced a framework on which to base a pilot-plant program. The first pilot plant is to be located at Library, Pennsylvania. The expectations are that

> The success already recorded by the petroleum industry in process of making gasoline from natural gas, now maturing on a commercial basis, makes it appear that efficient and reliable synthesis processes will be well established by the time the coöperative program for making synthesis gas from coal has been completed. . . .
>
> The engineering development of the pilot plant, and the mechanical engineering of a commercial plant, will be conducted simultaneously. Before the process engineering is completed, the mechanical engineers should be well advanced with plans for the big plant.

THE account continues with a description and diagram of the coal refinery, a "completely integrated producing and processing unit turning out high-grade synthetic gasoline, oil, gas, and a multitude of by-products." The same unit will further process oils and alcohols to obtain a wider range of end-use by-products, it is claimed.

The most optimistic viewpoint favors a combination of coal gasification unit and a synthetic fuel unit. The first would generate the synthesis gas, a mixture of carbon monoxide and hydrogen. The second would convert this synthesized gas to a mixture of high BTU gas, synthetic gasoline, and oils, plus alcohols and related compounds.

The story is concluded with notes on mining developments and a list of organizations, both industrial and educational, which have made significant contributions to the eventual realization of the objective. Recognition is given also to the fact that there are still obstacles that must be hurdled before a complete commercial-scale plant can be built.

The title of the brochure cited is "Coal Evolution, Not Revolution." It is ten pages in length including two graphs and a diagram. This pamphlet may be obtained from the research and development division of Pittsburgh Consolidation Coal Company at Library, Pennsylvania.

—F. T.

France's Experiments with Nationalization

TIMELY comment about the results of France's program of "nationalization" comes from Charles R. Hargrove, correspondent for *The Wall Street Journal*. It seems the program does not meet with the favor that it enjoyed a year ago. This type of situation should be a familiar one by now, with so much learned from the British experiences. It appears that it is one thing to nationalize these industries (coal, electric, and gas) and another thing to make them work, once nationalized. To quote the article:

> The "National Collieries" and "Electricité de France" are found to be costing a lot of money and to be operating inefficiently. They are the subjects of governmental and parliamentary investigations and heated controversy in the press.

Hargrove says the latest estimates put the 1947 operating deficit of the mines between $100,000,000 and $115,000,000 if francs were converted into dollars at the official rate. He continues:

> . . . For the national electricity-gas corporation the deficit is reckoned at $150,000,000. In addition, as large or larger sums are required this year for reëquipment and modernization. The managing directors of both of these huge combinations have lost their jobs and several other appointments on the new boards have been, or are being, canceled.

IT is stated in the article that the Minister of Finance is finding it difficult to obtain money to cover the ordinary national expenditures, and simultaneously raise needed additional money for rebuilding war-ruined shops and homes. It is insinuated that a request for funds to cover the current expenses of the country's new industrial enterprises would be tantamount to rubbing salt into raw flesh. A report issued by the Finance Ministry to the Chamber of Deputies revealed the absence of any systematic control of accounting in the operation of the industries and irresponsibility on the part of public management.

In recognition of this, a law has been enacted compelling government-owned corporations, whether the ownership is in whole or in part, to publish regular reports of their proceedings.

In commenting on the financing of these nationalized industries the article states:

> . . . the trouble with the mines and the electrical and gas enterprises is mainly that costs of production have run ahead of sales prices . . . the increase in the one case is 30 per cent and in the other 19 per cent . . . the workers are paid more but produce less. Thanks to employment of German-prisoners-of-war output has been raised above the 1938 level . . .
>
> The situation is grave, says the director-general, and unless a remedy is found the theory of nationalization and therewith the new and highly privileged status of the miner will be imperiled.

The comment is made that the gas and electric combined have to "shoulder the burden of compensation granted to former owners of the properties" and have to "pay wages which have risen disproportionately to rates." With no reserves to draw on, and no dividends on which to defer payment, there is no source of relief.

THE article suggested the obvious alternative that the government could, if it wished, meet the operating expenses by raising prices. Politically this move would be foolhardy. A socialist coalition cannot condone rising costs in such commodities as coal, gas, and electricity. The government has determined to make sure that the industries concerned are "operated efficiently." But, as the article suggests,

> . . . it is not so easy to make efficient an enterprise nationalized in the conditions prevailing here after the war . . . apart altogether from the question whether nationalized undertakings can ever be as efficient as private.

The correspondent explains in reference to the coal mines that

> . . . Nationalization was carried through under a Communist Minister of Production, who is generally admitted to have exploited the occasion in the interests of his party . . .

"SHORE, HIT'S A GOOD IDEE; BUT WHATTAYA DO WITH TH' DANGED STUFF AFTER HIT GITS HOT?"

natural, since the miners' union had come under communist control.

Accentuating the ills that one learns to associate with bureaucratic operation of public enterprises, particularly incompetent men were appointed as managers of the coal, electricity, and gas industries. He states in the account the following:

> . . . equally true of both nationalizations, in any case, are the difficulties of finding the right kind of men to take the places of those identified, in Marxist terminology, with capitalism and reaction; of preserving a sense of discipline among the lower ranks in spite of the changes in the higher ranks, and . . . of determining the policy to govern the entire experiment.

In conclusion, it is stated that the crux of the problem concerns a choice by the government between "nationalized key industries" that must bear their own expenses, if not make profits, and the alternative in which these are continually subsidized by siphoning from public pockets in some devious way.

A safe guess, says the writer, is that with the present French political situation and inflationary economic trend, these so-called "nationalized industries" won't pay their way, but will remain directly or indirectly subsidized.

France's economy, trying to regain its footing, is beset not only with disturbances and strikes inspired by the communists and other left-wing agitators, but by right-wing rumblings as well.

Is Labor Telling Stories?

It is a well-known fact that the worker in the United States has the highest standard of living, the shortest hours, and the highest wages in the world. One suggestion offered to raise that standard even higher for future prosperity and security is to foster better management-public relations and better labor-management relations. Such was the opinion expressed by Rodney Chase, of Chase Brass & Copper Company, at the conference on general management problems held under the auspices of the American Management Association.

Preparation for the address evidently entailed research in labor and management publications and speeches, and, as a result of comparisons made during this study, Chase feels that labor should discard its inaccurate language. He states:

> Must we go on forever pretending that all business is antiunion, that all employers are brutal slave drivers, and that all employees are underfed and underpaid and mistreated? All this in the face of good management-labor relations in thousands of plants throughout the country, where unions do an honest, helpful job for their members, and management representatives, union leaders, and employee committees respect each other and work together in harmony.

In the original address the actual verbs, nouns, and adjectives employed by labor are compared with those used by management. Mr. Chase believes that it is time for labor to change its language from its hackneyed set of lash words to a usage which would coincide more accurately with labor's current position. His attitude is disclosed in the following statement:

> Last week I heard a labor representative speak at a meeting. How did he describe the present position of labor? He used the same old phrases, "Labor, ground under the heel of the arrogant capitalist" — "A noose around the neck of labor" — "A whip that cuts labor at every stroke" — "Labor, picking up the crumbs that fall from capital's table." Do you recognize the American worker?

Chase sees the prosperity of America as dependent upon the maintenance of our system of democracy, and not solely dependent upon resources or efficiency. The many freedoms inherent in that system enable business to profit; stockholders to receive their dividends; the public to receive better products at lower prices; and the worker to get higher wages as he becomes more productive through effort, skill, better tools, and methods. He believes that the public should be informed of the facts by a continuous, long-term educational program, for, as he says,

> Employees form their opinions about the type of government they want, or what business should do, or what the profits of business are, and what they ought to demand from business long before the contract demands are made and a strike is threatened. . . . What may seem like old stuff to us may be blindingly new or highly controversial to millions of Americans who have been taught exactly the opposite for the last fifteen years and more.

In citing the relative living standards of Americans and Europeans, Mr. Chase says:

> We know that it is because of better tools and methods that the American worker for one hour's work can buy food for which the English, French, Italians, or Russians must work two to five hours. We know that the income of 140,000,000 Americans is greater than the income of all Europe—some 600,000,000 workers.
>
> But do our production and maintenance workers know it?

Chase believes that the company's spokesman should have the knack of speaking simply, and being a sincere, understanding, and human person. He states in conclusion:

> Management's public relations influence management's labor relations also, for labor is part of the public.
>
> When we convince the public, we will take a long step forward in bringing about good labor-and-management relations.

No doubt many have entertained ideas running parallel with Mr. Chase's comments. It would appear that current thought favors a trend away from the stereotyped class conflict utterances which have plagued public statements and labor literature during the past three decades.

WHAT OTHERS THINK

Esquire Profiles the Inventor of Alternating Current

"GREATER even than Edison." That's what Arthur Brisbane called Nikola Tesla, the inventor of alternating current, who is profiled in the October article, "Ahead of His Time."

Tesla's first great contribution to science was the alternating current motor. Although Edison is credited with the invention of electric lighting, the direct current used in his incandescent lamps was impractical for mass use. Tesla's discovery made it possible to use thousands of electrically driven machines and eliminated the necessity for costly direct current conduits and brought electric lighting into universal use.

Born in the Austro-Hungarian province of Lika, Tesla landed in New York at twenty-seven and got a job with the great Edison, doing repair work on DC dynamos. After he quit his Edison job, his big break came when he lectured on his revolutionary alternating current theory before the American Institute of Electrical Engineers.

The assembly grasped the terrific import of Tesla's discovery and overnight he was "made."

Tesla sold his discovery to George Westinghouse for a million dollars plus $1 royalty per horse power on all AC articles sold. When Westinghouse asked him to relinquish his rights to the $12,000,000 in royalties already earned, the *Esquire* article states, Tesla did so and saved Westinghouse from his creditors.

When Tesla perfected an electronic tube for use as a detector in a radio system, he beat Marconi to the punch by six years, says *Esquire*. The profile goes on to say that his grasp of electrical transmission did not stop at sound, for he built a broadcasting system in Colorado Springs that transmitted enough power across 26 mountain miles to light 200 incandescent lamps—without wires. He found that this wave sent back an echo—an unrecognized forerunner of our modern radar.

He had a typical scientist's attitude toward finances, and, for lack of money, many of his inventions died stillborn. Some of them were appropriated outright because he could not be bothered with the red tape of procuring patents. It is said that he invented the X-ray a decade before Roentgen, but destroyed the tube when one of his technicians got a severe burn and lost his arm.

Despite the vast number of ideas he never got down on paper, Tesla, the man that was "Ahead of His Time," was responsible for more than 200 inventions before his pauper's death in 1943. He left, to the world that has never fully recognized him, declares the October *Esquire* article, a truly magnificent legacy.

Coal's Future Depicted before Savants' Gathering

THE 112th annual meeting of the American Chemical Society, held at the Hotel Pennsylvania in New York, in mid-September, heard a group of scientists describe new techniques which propose to produce fuel gas and synthetic gasoline from coal.

A Bureau of Mines report, on the possibility of reducing costs in the production of synthetic gasoline, said in part:

> ". . . Half the cost of synthetic gasoline manufactured lies in making the new material synthetic gas . . . in this new method, synthesis gas can be made directly from powdered coal.

In another report before the gathering, Professor Warren K. Lewis, of Massachusetts Institute of Technology, described the technique of gasifying coal. This concerned the possibility of obtaining an abundant supply of fuel gas from

all grades of coal by the treatment of powdered coal with hot air and steam.

Production of cheaper and better heating gas by this technique will be followed by the manufacture of special fuel for the new gas turbine engines which will be built to operate power plants, according to the professor.

Among the several possible applications of the process is the manufacture of a gas suitable for domestic purposes which can be made efficiently in small plants by removal of carbon dioxide impurities. Sub-bituminous coal will yield 40,000 cubic feet per ton, and lignite 30,000 cubic feet per ton, it was reported.

ANNUAL waste of millions of tons of lignin—major component of wood, and a by-product of pulp processing—may be halted as a result of the synthesis of this raw material, about 38,000,000 tons of which is produced along with the manufacture of paper, rayon, plastics, smokeless powder, and photographic film, according to Dr. Alfred Russell, Northern Regional Research Laboratory, U. S. Department of Agriculture, Peoria, Illinois.

—F. T.

Gas Industry Plans for Building Domestic Load

AT the New York-New Jersey Regional Gas Sales Conference, held in Spring Lake, New Jersey, the latter part of June, 200 eastern sales and advertising executives discussed plans for the industry's drive to retain and enlarge the domestic gas load.

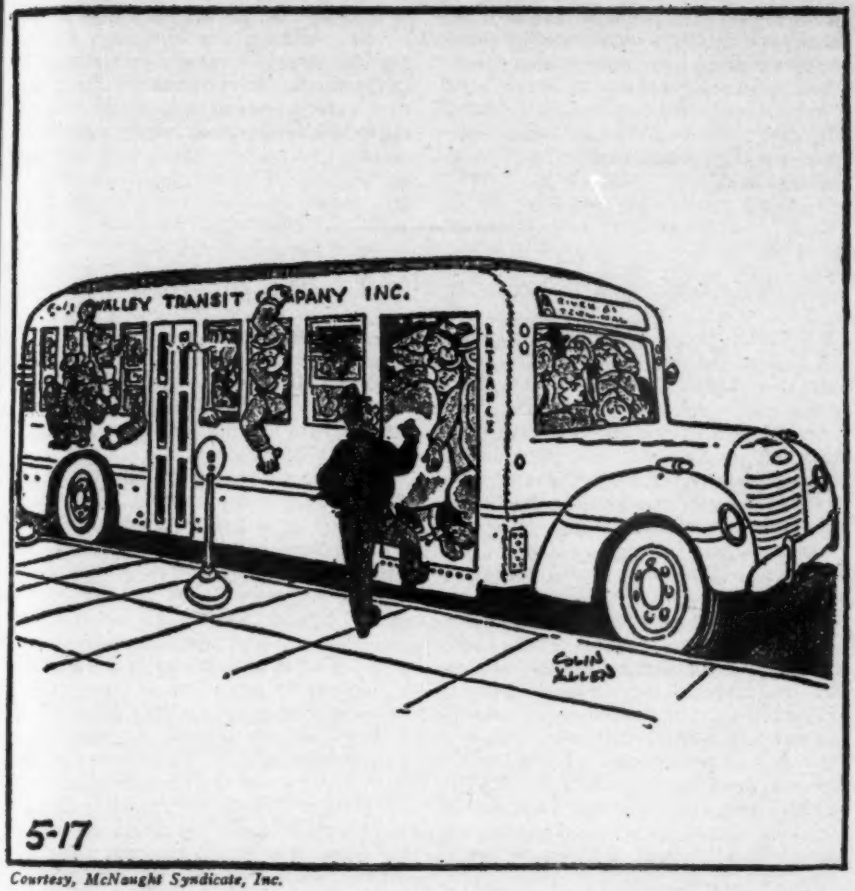
Representatives of gas distributing utilities in three eastern metropolitan centers explained promotional programs, successfully in use, to increase the installation in homes of the New Freedom Gas Kitchens. Detailed plans as part of this promotional activity were also presented at the meeting, as features of the participation of both the American Gas Association and the Gas Appliance Manufacturers Association.

The modern gas laundry, with its various appliances, and hot water equipment, as well as the gas range, were discussed, the representatives of several manufacturers presenting both descriptive details and sales points.

THE conference was addressed by W. B. Hewson, manager publicity and advertising, Brooklyn Union Gas Company, speaking as a member of the AGA National Advertising Domestic Copy Committee. Mr. Hewson described a new, short-term advertising campaign to be instituted this fall in national magazines, accompanied by a coördinated drive to promote automatic gas cooking. He said, in part:

> Eleven years ago the gas industry snapped into action nationally by telling the American public about its product and its appliance and equipment. Some $5,000,000 have been spent to date in this campaign in magazines with national circulation. During this period the gas industry has presented itself to the public as a modern, wide-awake, and thoroughly progressive industry. The results of this large-scale drive to sell our business to homes and industries are clearly visible. National advertising has helped to inject new confidence and vigor into the sales personnel of our business. It has helped to increase appliance sales. It has given renewed encouragement to gas men located wherever magazines that influence the lives and habits of American families are read. It has developed a higher degree of loyalty to gas fuel from those in the industry. It has been a powerful factor in reversing the direction of public thinking as to the future of the gas industry. Finally, in the field of finance, it has impressed investment bankers and others with the gas industry's stability and earning power.
>
> Here's some evidence to back up these statements. During the eleven years our industry has supported the national advertising program, customers have increased 30 per cent. Population served shows a gain of 16 per cent. Gas sold in therms has increased 105 per cent. Gas revenues have gained 66 per cent and miles of gas mains in use have increased 16 per cent.

The blueprint for the special high-pressure advertising campaign, involving an expenditure by AGA of $200,000, will



Courtesy, McNaught Syndicate, Inc.

"WHADDAYUHMEAN THERE'S NO MORE ROOM—I'M THE DRIVER!"

be the nine points, it was stated, on which women base their range choices, as revealed by a recent survey by Elmo Roper. These were listed as:

(1) Automatic operation, (2) more modern conveniences, (3) clean range and kitchen, (4) easy to cook on, (5) cooks food better, (6) cooks foods faster, (7) cool range and kitchen, (8) least cost to operate, and (9) least cost to buy.

THE final feature of the conference program was an address by A. C. Fox, Fuller Brush Company, Pittsburgh. Talking on the theme, "There's Gold in Them Thar Doorbells," Mr. Fox, an exponent of direct door-to-door selling, said that housewives are the greatest group of purchasing agents, and that the home is an ideal setting for sales.

Selling is a scientific process, he added, and every sale is made in the mind, first in the seller's mind and finally in the buyer's mind. He stressed the vital necessity for adequate preparation and the proper attitude on the part of salesmen.

The ideal salesman should have every

positive qualification such as: likeableness, joviality, audacity, pioneering spirit, resourcefulness, restraint, altruism, industry, teachableness, ambition, and "know how." All progress is the result of a sale, Mr. Fox continued, and "man power is the greatest undeveloped power in the world."

The proceedings at this regional conference indicates the intentness of the gas industry to develop a greater use of gas in the home by means of active, nation-wide sales efforts, coupled with an extensive national advertising campaign.

—R. S. C.

Horatio Alger in the Utility Business

WHILE this reviewer makes no pretense of having read all of the Horatio Alger stories and retains no definite recollection of more than a fraction of them, it does not come to mind that that great chronicler of juvenile ambition, honesty, and other virtues ever gave his hero a setting in the public utility business—with the exception of perhaps a telegraph messenger boy.

John T. Winterich, former managing editor of *The Saturday Review of Literature* and frequently a contributor to *The New Yorker,* has remedied this deficiency in a rather humorous and loose autobiographical story of his own rise to fame and fortune. One might be tempted to add a pun on to that last sentence—"by acts of providence." For all of the actions, described so amusingly in Winterich's best seller "Another Day, Another Dollar," take place in and near Providence, Rhode Island, between the period 1903 and 1912.

Needless to say, Mr. Winterich is too smart a writer and too congenial a wit to make himself out as any sort of a hero. Actually he seems to be a sort of witness with a good memory for writing down dozens of laughable things which happened to him as a boy trying to get started on an education in Brown University (from which he graduated in 1912).

FOR example, there is disregarded the usual sentiments of book dedication for which even the most mild author seems to be excused as he mysteriously tells us in the opening pages that his work is dedicated to "Dear, dear Alice," or "My wise and affectionate friend John." Winterich comes right out and dedicates his book to the "Providence Gas Company." It is probably the only dedication of its kind in contemporaneous American literature.

The idea for writing the history of his wandering and impecunious youth came to Winterich at the beginning of World War II when he was making out the usual forms preliminary to entering his country's armed forces. One of these forms called for a "complete" list of his civilian occupations. Winterich throttled his brain in an effort to trace his economic life, beginning at the age of twelve, with a job of delivering groceries for $1 a week, through an assortment of surprising money-earning adventures down to the age of twenty-one. The author cuts off his book at this point (probably an unblushing bid for another instalment in the form of a sequel); but no doubt his Army form continued on through the real success and maturity of one of America's most wholesome and talented living writers.

The result of this listing for the edification of the United States Army fascinated Winterich and he decided it might make a good book. Fortunately he found a publisher to agree with him. What makes this book of special interest to public utility men is the odd fact that the youth John Winterich always seemed to gravitate towards some modest calling or other in the utility business. His very first recollection as a small fry in knickerbocker pants had rather a negative utility angle.

The curtain rises on this young man throwing a stone and shattering a street light serviced by the Narragansett Electric Lighting Company. Remorse aided by fear for a $10 penalty and a stern father goaded the boy into making a voluntary confession and offer to make restitution. The official of the Narragansett Electric Lighting Company was so overcome with this unusual display of honesty that he offered the boy a job.

EACH chapter thereafter recounts an ironical and pointed venture in money making, not all of them, of course, in the utility line. The hero becomes a house-to-house salesman of water filters (plain or threaded). He became a haberdasher salesman, a department store salesman of kitchen goods, a butcher's assistant (with a side venture into romantic and anonymous correspondence), a runner for a jewelry firm.

His first direct encounter with the public utility business was as a meter reader for the Providence Gas Company, for which he was paid from a cent to a cent and one-fifth for every meter reading recorded. Bearing in mind the high purchasing power of currency at that date (1909-1912) Winterich managed to do very well at this, even on a part-time basis, as a student attending classes at Brown University. He liked the tenement house district where the meters were all banked in one place, dozens of them. He says that on a good day, with no college classes, he could read over 500 meters, earning around $6.

One of his odd adventures on this job was teaching a lady customer of the gas company how to start an explosion by testing for gas leaks with a match. He had not intended it to end that way, but that was the net result.

Following a tour of duty as a census taker, as a salesman for aluminum kitchenware, and as a part-time postal clerk, Winterich took his next public utility employment as a trolley car conductor. He recalls how many streetcar crew members of those days were nomads wedded to a life of perpetual motion. He also remembers some of the jargon of the trade which would seem strange to us in this day of one-man streetcars and de luxe busses. These three chapters on "railroading" (all of which have been published in serial form in *The New Yorker*) appear to be the most interesting in the book.

—F. X. W.

Fallacious Public Opinion about "Big Business"

DUE to failure on the part of business management to make the facts available, most people in the United States entertain mistaken ideas about the ownership of big corporations. According to a report recently published by Controllership Foundation, Inc., an economic research organization established by the Controllers Institute of America, eight out of ten persons possess no knowledge on this score, and almost a third believe that "a handful of men like the du Ponts, Rockefellers, and Fords own most of the corporations in America."

The report is based on a survey by the Psychological Corporation, under a grant of funds by the foundation. "It proves," says Daniel J. Hennessy, president of the foundation, "that the average citizen fails to realize that Main street, rather than Wall Street, owns our corporations—not the 'economic royalists' or the 'international bankers.'

"Because the average citizen is not aware of this widespread ownership of American corporations by small stockholders, economic fakers can readily mislead him about 'enormous profits' and 'greedy capitalists.' The public needs truthful information about the ownership of American business enterprise, and particularly about the ownership of big business. This is a problem

which concerns fiscal officers and controllers, public relations officers, and all others in business management."

FEWER than half of the people questioned in the nation-wide survey believe that the owners of big corporations are ordinary people who have spare money to invest, and 40 per cent of them think that terms like "big businessmen," "capitalists," or "bankers" describe corporation owners better than does the term "stockholders."

"Seven out of ten people say they think well of persons who own big corporations," the report declares. "Twenty-nine per cent think they are thrifty; 27 per cent think they are hard workers; 18 per cent say 'all they think of is how much money they can make'; 15 per cent think 'the owners are mostly millionaires'; 11 per cent think 'the owners are greedy, selfish people who are out for power'; and 9 per cent think 'they are society people who spend their winters in warm places and their summers in cool places.'

"Persons in the higher income brackets say they have given more thought to—and appear to be better informed on—corporation ownership than people in the lower brackets, as would be expected. Men appear to be better informed than women; at least, men have thought more about the subject than have women. Stockholders appear to be better informed than nonstockholders. However, even the best informed and the most interested groups readily admit ignorance on the subject.

"A special analysis was made of the 10 per cent who frankly say they do not think so well of the owners of big corporations.

"Four out of ten persons in the antagonistic group say the owners are 'mostly millionaires,' although only between one and two in ten in the total sample say this. Only one in ten of the antagonistic group thinks big corporations are owned by the general public, as contrasted with about 50 per cent in the total sample.

"The hostile people, on the whole, tend to live in cities of more than 500,000, often in the East and to be concentrated at the lower income levels. But the hostile group is not a particularly young one, nor especially old, and its members are about evenly divided between the sexes."

When Oil Lighted London

WHEN *Britain recently ended summer double time, cutting once more to five hours the difference between the clocks of London and New York, the event recalled that street lighting with oil lamps was a "brilliant" innovation in 1684.*

The lamp employed was the invention of Edward Heming who obtained a monopoly in the capital. In return for a small fee he provided a lamp before every tenth door on moonless nights from Michaelmas to Lady Day. The lamps were lit at 6 PM *and extinquished at midnight. They replaced casual tin lanterns with candles supplied by three of the livery companies.*

The contract system ended in 1736, with a tax on householders producing £15,000 in the first year, but the lamps were still doused at midnight. An improved oil lamp survived the introduction of gas lighting in the first years of the Nineteenth Century, residents in Grosvenor Square not losing their lamps until 1842. One reason for their popularity with Londoners was their handiness for making up any shortage of lamp oil in the home.

The March of Events

In General

AGA Annual Convention

THE American Gas Association's twenty-ninth annual convention was scheduled to be held at the Cleveland auditorium in Cleveland, Ohio, October 6th to 8th, inclusive. The address of welcome was to be delivered by Mayor Thomas A. Burke of Cleveland. R. H. Hargrove, president, also was scheduled to address the convention on the first day.

On October 7th Nelson Lee Smith, chairman of the Federal Power Commission, was to deliver a speech on the regulation of gas utilities. Also scheduled to speak on that day were Daniel J. Hennessy, vice president, Jamaica Water Company, and D. P. O'Keefe, president, Gas Appliance Manufacturers Association.

On October 8th another general session was scheduled to be held in the morning, featuring the following speakers: Frank H. Adams, president, Surface Combustion Corporation; J. J. Quinn, vice president, Boston Consolidated Gas Company; Joseph Pursglove, Jr., vice president, research and development, Pittsburgh Consolidation Coal Company; Ernest R. Acker, president and general manager, Central Hudson Gas & Electric Corporation; Ward Keener, vice president, B. F. Goodrich Company; Alfred Hirsh, vice president, Laclede Gas Light Company.

Several special sessions also were slated to take place during the Cleveland meeting. The natural gas department was to hold its own session on the afternoon of October 7th at the Hotel Statler, with the following speakers listed: Robert W. Hendee, vice president, American Gas Association, and chairman of the natural gas department; Dr. A. W. Gauger of the Pennsylvania State College; Max W. Ball, director, Interior Department's oil and gas division; and W. F. McConnor, vice president, National Tube Company, Pittsburgh, Pennsylvania.

A special meeting on accounting and property records was scheduled at the Carter hotel on the afternoon of October 6th, slating the following speakers: A. W. Hatch, Ebasco Services, Inc.; H. D. Borger, Peoples Natural Gas Company; J. P. Fleming, Ebasco Services, Inc.; W. G. Pilgrim, Peoples Gas Light & Coke Company (Chicago).

Other specialized meetings included one on taxation (in collaboration with the Edison Electric Institute), materials and supplies accounting, customer accounting, general and property records accounting, home service, industrial and commercial gas, residential gas, and technical.

Cities Improve Street Lighting

ACTION by cities to provide better and more economical street lighting is under way in many sections of the country, the International City Managers' Association reported recently.

A survey by the association of lighting expenditures of 15 representative municipalities indicated that cost variations among these cities appeared to be more or less independent of the quality of street lighting supplied.

Champions State Rights

THE National Water Conservation Conference wound up its 2-day convention at Kansas City on September 19th by passing several resolutions in-

dicating its position of championing state rights against Federal encroachment in water resources matters.

In the first resolution introduced at the session, the conference went on record in favor of a recommendation that Congress establish a commission to review the whole field of land and water conservation. Such a commission was urged in order to "accomplish the highest use of these great natural resources for the best economy of the nation and in keeping with our form of government."

Another resolution came out strongly against regional or valley authorities "to the exclusion of effective participation by states and local interests." A resolution on the tidelands case pledged the conference to seek passage of Federal legislation "to renounce the powers attributed to the Federal government by the Supreme Court in the California case."

Most of the resolutions introduced were adopted unanimously, with argument concerned mostly with phraseology or certain shades of meaning. The most lively controversy developed over a resolution condemning the present personnel of the United States Bureau of Reclamation.

The resolution, which was one of 17 prepared by the association resolutions committee headed by J. E. Sturrock of Austin, Texas, charged that staff changes in the bureau had resulted in the "replacement of experienced men and the introduction of debatable policies based on questionable social theories." The resolution urged that the bureau be returned to "those experienced and qualified for such work."

C. H. Stone of Denver led the opposition to the amendment on the grounds that it was a serious indictment which many of the delegates could not reasonably be expected to vote since they had no occasion to deal with the bureau. Other speakers pointed out that the resolution was a "gratuitous insult" which they considered out of place. By the unanimous vote of the convention the resolution was tabled.

Arizona

Power Rate Set

ANOTHER phase of the long-standing Eloy power rate dispute was disposed of last month when the state corporation commission, by majority vote, ruled that all power users in that district shall pay their July and August bills on the basis of an "interim" rate established by commission action last February.

This rate was fixed pending examination by the commission to establish a permanent rate schedule. The study has never been undertaken because of pending negotiations for sale of the Eloy Light & Power Company and because it delayed entering into a new contract with the Salt River Valley Water Users Association, which furnishes its electric power supply, in anticipation of obtaining cheaper power from the Colorado river.

The Water Users increased wholesale power charges to the Eloy firm by approximately 100 per cent on July 1st, because it said its own sources were not sufficient and it was compelled to buy higher-cost power to serve the Eloy company.

Late last August the Water Users cut off power service to farmers in the Eloy district for a 24-hour period. Service was restored when farmers raised $61,000 to apply on June power bills, which charges were based on the new rates set by the Water Users.

Unsettled until the commission's recent ruling, however, was the matter of the rate basis for July and August power charges to Eloy consumers.

Wilson T. Wright, commission chairman, and Yale McFate, member, voted to base the rates for those months on the

February "interim" schedule, taking the position that the Eloy Company was neglectful in not negotiating a new contract with the Water Users before the old one expired June 1st. Dissenting was William T. Brooks, member.

Gas Bond Issue Vote

A $133,000 revenue bond issue was scheduled to be submitted to Willcox voters October 3rd at a special election, it was announced last month.

The proceeds, if the issue is approved, will be used to bring natural gas to the city by tapping the pipe line of the El Paso Natural Gas Company, with which a contract has been signed.

Position Declared "Vacated"

KENNETH B. ALDRICH, director of the Arizona Power Authority, lost his job last month when his position was declared "vacated" by the authority commission.

The action, predicted for a week, resulted from a fundamental difference of opinion betwen Aldrich and the commission on the method to be used to bring Colorado river power into Arizona.

M. J. Dougherty, chairman, announced recently that the authority and the Bureau of Reclamation had worked out a tentative coöperative agreement under which the bureau would build the main transmission lines of a state power grid, and the authority will build the lower tension lines to reach specific markets not served by the main system.

Aldrich has maintained the position that the state should build the whole system under a program involving $30,000,000 in bonds, once projected by the authority before it knew the bureau could be interested in building the major transmission circuits.

Aldrich's ouster was noted by the authority in a single sentence of a formal report on its special meeting. It said: "In view of prospective changes in the power programs, the commission vacated the office of authority director presently filled by Kenneth B. Aldrich and further reduced its personnel."

Arkansas

FPC Refuses to Reconsider Rule

THE Federal Power Commission recently refused to reconsider its June 19th dismissal of an application by the White River Power Company to construct a hydroelectric project at Bull Shoals dam and reservoir in Baxter county.

The FPC said Congress had authorized the War Department to construct the Bull Shoals project and to use its storage and head.

California

Power Curb Not Needed

CALIFORNIA'S electric power shortage is not sufficiently serious to justify a brown-out of advertising billboards or appointment of a power administrator, the state public utilities commission held recently.

Both actions were requested at an informal session last month between Commission President Harold P. Huls and representatives of labor, agriculture, and other interests. After consulting other members of the commission, Huls issued the following statement:

> The commission and its staff is watching the surplus power situation closely. At this time there is no necessity for either a so-called "brown-out" or the appointment of a power administrator.

Lack of power due to low rainfall and high demand last August caused the Pa-

cific Gas and Electric Company to curtail deliveries to three East Bay factories. The winter rains are expected to ease the shortage.

Florida

Override Mayor's Veto

THE Jacksonville city council last month voted to override Mayor C. Frank Whitehead's veto of the two utility tax bills, already passed by council, and the measures now become law. The vote to override on the bill for electricity, water, and gas was 16 to 2. The telephone tax measure veto was overriden by a vote of 13 to 5.

The bills place a 10 per cent monthly tax on all users of electricity, gas, water, and telephone service up to $500; 5 per cent on the next $1,500; and a 1 per cent tax on monthly bills in excess of $2,000. It has been estimated that the two measures will raise more than $1,000,000 yearly for municipal expenses.

Mayor Whitehead, speaking in defense of his veto, said that he considered the measures too drastic for the small user.

An effort to pass an amendment to limit the life of the two bills to the end of the 1948 fiscal year was defeated. Several councilmen want the bill to continue in force until the end of 1949.

Iowa

Utilities Lose on Use Tax

THE state supreme court, in a 4-to-2 decision, last month held that poles, wires, transformers, pipes, valves, and other equipment used by gas and electric companies are not exempt from Iowa's 2 per cent use tax.

Three justices, William Bliss of Mason City; Oscar Hale of Wapello; and Norman Hays of Knoxville, concurred with Chief Justice Ralph Oliver, Sioux City, in the finding. Justices W. A. Smith of Dubuque and H. J. Mantz of Audubon dissented.

Three other justices took no part.

The decision was made on the state tax commission's appeal from a Cerro Gordo county district court decision which had set aside a tax commission assessment of $5,818 in tax and $1,849 in tax penalties on such equipment purchased by the Peoples Gas & Electric Company, Mason City. The equipment was purchased outside the state.

The use tax is the companion measure to the 2 per cent retail sales tax and applies on property purchased outside Iowa for use in Iowa.

Kansas

Sees Gas Shortage

DISTRIBUTORS serving the Middle West will not be able to handle enough natural gas to prevent a shortage of that fuel during the peak consuming season early in January, Jeff D. Robertson, chairman of the state corporation commission, predicted last month.

Cities and towns in eastern Kansas will be affected by the shortage, he said, until completion of a new pipe line by the Cities Service Gas Company, some time next year. Some industries in the Kansas City area will be cut off the gas lines in order to provide fuel for home users, Robertson said.

The official explained the shortage will result from transportation problems, and not from reserves in the Hugoton and

other fields of western Kansas. Even with 163 Hugoton wells closed for overproduction, Robertson said there was more gas available under commission orders than the pipe lines can handle. The closed wells will not be opened until late this year, he added.

Early this spring the commission issued a warning to gas users in Kansas to set up stand-by equipment for coal or fuel oil, since it was evident at that time that proposed pipe lines could not be constructed by the coming of cold weather.

Kentucky

Restrictions Reimposed

THE state public service commission on September 19th reimposed restrictions on the conversion of coal-and-oil-fired home furnaces to gas. The ruling, however, permits service to customers who have converted to gas since all restrictions were lifted September 1st.

New residences under construction March 10th, built thereafter, or constructed in the future may be supplied with gas without limitation as to size of furnace. Previously the company had sought to impose a limit of 200,000 BTU capacity gas installations, which would have prevented use of gas for heating in larger apartment houses.

The commission's order, signed by Chairman Charles E. Whittle and Cass R. Walden, declared that "the assured supply of gas for Louisville Gas & Electric Company for the winter of 1947 and 1948 is insufficient."

"Unless temporary emergency restrictions on the use of gas are imposed, there is danger of the shortage of gas becoming so acute during the next winter as to endanger the health and safety of the gas customers of the company," the order said.

Co-ops Purchase Utility

PURCHASE of the Kentucky Edison Company by two rural electric cooperatives was announced in Flemingburg last month.

James K. Smith, manager of the Fleming-Mason Coöperative, said the Kentucky Edison system had been bought by the local co-op and the Licking Valley REA coöperative for $200,000. Kentucky Edison Company has operated an electric-generating plant near Stanton in Powell county, serving communities in Powell, Menifee, Wolfe, and Morgan counties.

The Fleming-Mason and Licking Valley co-ops will divide the territory and add it to their present systems, Smith said.

Harry Peet, president and general manager of Kentucky Edison Company, will continue to operate the generating plant near Stanton, which will sell electricity on a wholesale basis to the Fleming-Mason coöperative.

Maryland

New Gas Restrictions

THE Cumberland & Allegheny Gas Company last month announced that on September 20th it would discontinue the approving of applications for new central heating equipment designed to use natural gas fuel.

Its decision, according to the announcement, was based on "continued delays in the delivery of steel pipe and other equipment required to expand transmission and distribution systems plus an unprecedented demand for natural gas."

The action was reported as a supplement to initial restrictions which became

effective March 1st. Customers have been advised by mail that the new restrictions were placed in effect for the protection and continuance of adequate service to present gas users.

Warning that "there is every indication of a serious situation developing for all fuels during periods of low temperature next winter," the company asked its customers to coöperate in observing the tightened restrictions.

Exceptions to the new restriction against supplying gas to additional central heating equipment will be granted only in the case of new construction where gas-designed heating equipment has been purchased and installation has been completed or under way or where the applicant has entered into a contract for the equipment.

Such applications would have to be filed on or before September 30th, and approval, if granted, would carry the condition that the foundation of the building must be completed prior to January 1st.

Maryland towns served by the company include Cumberland, Frostburg, Mount Savage, Lonaconing, Oakland, Western Port, and Grantsville.

Missouri

Mediation Board Put in Labor Office

AN executive order assigning the new state board of mediation, created under the King-Thompson antiutility strike law, to the state department of labor and industrial relations for administrative purposes, was issued last month by Governor Donnelly.

The assignment, which will not affect any of the powers of the board of mediation, was made under a provision of the 1945 Constitution directing the governor to assign all state boards, bureaus, and other administrative agencies to the executive department to which their powers and duties are germane.

The King-Thompson law, which became effective on September 10th, prohibits strikes against essential public utilities and authorizes the state, through the governor, to take over and operate a public utility which is threatened with a strike or work stoppage. The act provides penalties for violations ranging up to $10,000 a day.

Pennsylvania

New Gas Rates Proposed

INCREASED cooking and heating gas rates of at least $1,000,000 a year were proposed last month by the Philadelphia Electric Company for suburban Philadelphia in new schedules filed with the state public utility commission.

The new rates will become effective November 15th unless the commission suspends pending its own investigation as to reasonableness or because of formal protests from users.

They will affect residential, commercial, and industrial consumers in Montgomery, Delaware, Bucks, and Chester counties as well as users of steam sold by the utility in Coatesville, West Chester and Philadelphia.

The company announced in Philadelphia that it was seeking the raise in rates because of increased costs of coal and oil and other production items including labor, while commission sources indicated the new schedules would be studied closely before any action is taken.

The new tariffs, presented to the commission by Ira L. Craig, manager of the utility's rate department, would establish a new general service rate for all areas of the company, replacing five separate schedules now in force.

South Dakota

Telephone Rates Unchanged

THE state public utilities commission last month left in effect the telephone exchange rates which were allowed last December and denied a petition by the Sioux Falls Traffic Bureau and Mitchell Chamber of Commerce for a reduction in intrastate long-distance toll rates.

The commission decision will make no difference in the exchange rate paid by subscribers. The new rates have been in effect since January.

The order said the record made at a hearing last June "not only sustains the report and order given by the commission December 27, 1946, but demonstrates that the earnings of the company are far below what has been found by the courts and commissions to be a fair return upon capital investment in telephone plants."

Exhibits introduced at the hearing indicated that the exchange increases granted by the commission will amount to an additional $506,000 annually for the Northwestern Bell Telephone Company in South Dakota, the findings of fact said.

Virginia

Vote Bond Issue

DANVILLE voters last month voted 1,406 for and 641 against a $1,500,000 bond issue to finance the construction of a new steam-generated electric plant.

A two-thirds majority vote was needed and the bond issue passed by a majority of 41 votes.

Construction of the plant will continue the city's 60-year ownership of public utilities.

Washington

Power Company Would Quit

THE Puget Sound Power & Light Company wants to get out of the electric energy sales field in Seattle if the city, as operator of City Light, still intends to aim at doing "all of the light and power business in this community," Frank McLaughlin, president of the company, said in a statement prepared recently.

The power company official's declaration of policy followed a statement by Councilman James Scavotto who urged that proponents of a merger of City Light and the private company "come forward with a concrete proposal."

McLaughlin emphasized that the city council in 1943 set forth an intent to expand City Light's facilities sufficiently to carry the whole electrical load of the community by 1952, when the private company's city franchise expires.

McLaughlin said the cheapest way for the city to do this would be "by acquiring at a fair price the company's facilities in Seattle rather than by constructing additional facilities at present high prices."

A new and higher rate for home-heating electricity in excess of 1,200 kilowatt hours a month has been proposed by the Puget Sound Power & Light Company, Andrew J. Zimmerman, director of the state department of public utilities, announced in Olympia last month.

The new rate would be 1.8 cents a kilowatt hour, compared with the present rates of .7 of a cent up to 2,100 kilowatt

hours monthly and .9 of a cent for over 2,100, in a completely electrified home.

The new rate, which would be identical with that of Seattle City Light, would apply only where heating is by central heating units, and portable heaters would not be classified as such, Zimmerman said.

For customers who start service before next January 1st, the new rate would not be effective until January 1, 1942, but all connections after next January 1st would be effective immediately.

The power company also proposed an optional commercial rate, effective October 6th, which it estimated would save small commercial users in the Seattle area about $45,000 annually, Zimmerman said.

Seek Signatures

PETITIONS seeking signatures to place on the municipal ballot next spring an initiative lowering City Light electric rates would be circulated in Seattle late last month, W. B. Clibborn, representing electrical-industry groups of Seattle, said on September 16th.

The move was an outgrowth of a recent controversy in the city council over the establishment of a higher rate for electrical home heating, subsequently approved.

Clibborn said the rate to be proposed in the initiative will provide a 12 to 15 per cent cut in general home rates, but to compensate for that a "demand" or penalty rate would be set for customers who use excessive quantities of electricity at times of peak demand when it is difficult to serve them.

The organization represents six groups in the Seattle electric industry. Clibborn said 12,000 signatures would be necessary to put the initiative on the ballot.

Wisconsin

New Rate-making Method

USERS of telephones, gas, electricity, and other utility services in Wisconsin are promised the most reasonable rates for these services that the state public service commission can devise if the courts uphold a new rate-making method adopted by the commission. Some rates may go down, some may go up, while others may remain unchanged.

The commission has decided to drop a 40-year-old method of setting utility rates and has begun a new system that has started a court battle that is being watched throughout the country.

The commission, in recently reducing rates of the Commonwealth Telephone Company, Two Rivers, announced that it no longer would set rates by a combination of formula for ascertaining present fair value of a utility's property to arrive at a fair rate of return. Instead, the commission set the Commonwealth rates by taking into consideration not only depreciated property value, but all operating, financial, and other relevant factors of the company's operations affecting profits.

The Commonwealth Company, holding that the commission's action is illegal, has obtained a restraining order from the Dane County Circuit Court enjoining the commission from putting reductions into effect until an appeal has been tried in that court. The commission ordered rate slashes totaling $10,000 a year. The company posted a $15,000 surety bond to assure rebates to subscribers should it lose its appeal.

R. J. Sutherland, Madison, of the law firm representing Commonwealth, said that an appeal had been taken on grounds that the commission's order is "unreasonable, unlawful, and not properly arrived at." He declared that the decision "was not supported by facts nor by any finding of facts."

It has been intimated that the state commission may apply its new theory to the petition of the Milwaukee Gas Light Company now pending for increased rates.

The Latest Utility Rulings

Company Authorized to Serve in Housing Project Area over Co-op Protest

THE Public Service Company of Indiana, Inc., has been granted authority to serve where a housing project was being disposed of by the Federal Public Housing Authority. Southeastern Indiana Rural Electric Membership Corporation and Indiana Statewide Rural Electric Coöperative, Inc., had objected to such authorization.

The Federal government had established a housing project known as the "John Paul Homes Project," in the housing project area, which was then outside the corporate limits of Versailles. As a condition for placing the project adjacent to Versailles, the government had required the town to accept it as part of the incorporated town so that municipal services would be available. Homes had been constructed and the Federal government had built an electric distribution system to supply the residents.

The electric company was serving Versailles, exclusive of the project area. The government had been buying electricity at wholesale from Southeastern REMC, and this energy had been obtained by the coöperative through purchases at wholesale from the electric company. The government was engaged in disposing of its interests. It had disposed of part of the housing units and had conveyed the water and sewage facilities to Versailles. It had asked for bids on the electric system.

The commission noted that this is no longer a rural area but is an integral part of Versailles and within its corporate limits. If the company is permitted to serve, the residents there will get the same service as that rendered in other parts of the town. Southeastern REMC, said the commission, is authorized by law to supply electric service only on a coöperative basis to persons who become members and assume the obligations of membership. Governmental regulatory control is substantially greater in the case of public utilities than in the case of coöperatives.

Public good and convenience, said the commission, are the yardsticks to be applied in determining the advisability of granting or denying authority. The company is able and willing to serve. If it were not granted authority, a section of the town would be deprived of the right to public utility service and persons residing there from time to time would be placed in a different position in this respect than residents of other parts of the town. This situation, said the commission, is one which, barring exceptional circumstances, the commission strongly believes, is not in the public interest. The commission said further:

> Apparently Southeastern REMC opposes the granting the declaration of public convenience and necessity to petitioner upon the ground that it has preëmpted the territory, and, therefore, if it is willing to supply coöperative service, it has rights to which the public must bow. Such a view is a misconception of the scope of the REMC Act and of the issues in declaration cases under § 18 thereof. The aim of the REMC Act was to provide a coöperative method of developing electric service for rural areas where public or municipal utility service was

not available. As the commission pointed out in its opinion in *Re* Indiana Service Corp. (Ind 1943) 48 PUR NS 185, 188, "the plain purpose of the act is to make electric energy available on a coöperative basis to the inhabitants of those rural areas of the state where electric distribution systems are not available from municipal or public utilities."

Re Public Service Co. of Indiana, Inc. (No. 19520).

Commission May Impose Conditions on Exemption of Securities under Holding Company Act

THE Public Service Company of Indiana, Inc., an operating subsidiary of the Middle West Corporation, was granted an exemption under § 6(b) of the Holding Company Act with respect to the issue and sale of convertible debentures. The Securities and Exchange Commission found that the issuance and sale were solely for the purpose of financing the business of the subsidiary and had been authorized by the state in which the company was organized and doing business.

Imposition of conditions shortening the conversion period, lowering the conversion price, and establishing a sinking fund was urged. The commission did shorten the conversion period. It said that it was apparent that to the extent that a long-term conversion period permits a debenture holder to convert into stock at a time when its market value is considerably higher than the conversion price, the company had proposed an uneconomical method of increasing its stock equity. The imposition of the other conditions was not deemed necessary.

Both the applicant and the state commission of Indiana contended that the imposition of the condition was beyond the scope of the Federal commission's jurisdiction. The legislative history of the Holding Company Act showed that § 6(b) was the result of a compromise between the provisions of the Senate bill and the House amendment. The commission said:

> It seems obvious that the compromise embodied in § 6(b) was intended to grant greater responsibility and vest a larger measure of regulatory power in this commission than had been provided for in the House amendment. First, unlike the House amendment, the compromise did not grant an automatic exemption; second, it directed this commission to grant an exemption from the requirements of §§ 6(b) and 7, only if the state commission had expressly "authorized" the issue, whereas the House amendment granted a statutory exemption if the issue was "subject to regulation by a state commission"; and, third, and most important, it expressly made the granting of such exemption "subject to such terms and conditions" as the commission deemed "appropriate in the public interest or for the protection of investors or consumers." These differences show that the compromise not only limited the scope of the § 6(b) exemption, but also contemplated that the security issues of all subsidiary companies, even though approved by state regulatory agencies, should be subject to this commission's consideration and to the imposition of such terms and conditions as this commission finds appropriate "in the public interest or for the protection of investors or consumers" in order to prevent the likelihood of abuses which Congress found prevalent in holding company systems.

The commission belived it possible under § 6(b) to give all due respect and effectiveness to the determination of the state authority and at the same time to fulfill the statutory responsibility imposed upon it. It thought that the legislative scheme and purpose could be fully effectuated if its power to impose conditions in connection with an issue approved by a state agency is employed only after giving weight to the decision of the state agency, and then only to the extent that the issue offends the basic standards and policies of the Holding Company Act and creates the likelihood of those abuses which lead to its passage.

In effect, it was noted, this means that a greater degree of latitude is permitted in applying the standards and policies of the act to a security examined and approved by a state commission and en-

titled to an exemption under § 6(b) than to an issue subject to all provisions of § 7 of the Holding Company Act. But where there is a material variance from those standards and policies, it is Federal responsibility, despite state approval, to impose appropriate terms and conditions. *Re Public Service Co. of Indiana, Inc. et al. (File Nos. 70-1477, 70-1484, Release No. 7554).*

Minimum Charges in Apartment Building Based upon Family Unit

A CITY rate ordinance providing that, if apartment house owners choose to install but one water meter in a building, the minimum service charge shall be the minimum service rate multiplied by the number of apartments in the building, was held to be valid by the Maryland Court of Appeals. This charge was not, strictly speaking, a service charge, but actually was a minimum charge which absorbed the service charge when the minimum was reached.

The minimum service charge was based on the family as a consumer unit. The court did not think that this was an unreasonable classification. The court said:

> It would, however, seem unjust to small consumers in single or multiple family dwellings to make them the same "minimum service charge" as an apartment house, however large, however small the average consumption of each apartment, and however large the potential or maximum consumption of all the apartments at any one time, and also to give the apartment house a lower consumption rate because of the number of apartments and the consequent large aggregate consumption of many small consumer tenants.

The apartment house was served through one service line with water measured by one meter. The owner had contended that since his apartments in the aggregate, but not each apartment, always used more than the minimum amount of service, he should pay no service charge but should pay only for water actually used. He pointed out that the per customer costs of serving a large apartment house through one service line and one meter are no greater than the cost of serving one family through a separate meter in a multiple family dwelling. The court stated that calling an apartment house a business does not alter the fact that it is an aggregation of dwellings. Therefore, it held, it is not unreasonable to classify it with other dwellings rather than with other businesses.

The contention that it is impossible to determine the cost of serving a family unit was rejected on the ground that it is not necessary to determine the cost of serving each customer or group of customers. Furthermore, it was held, the fact that certain customers are served on a flat rate basis equivalent to less than the meter rate subsequently adopted and provided by ordinance does not render the ordinance invalid where no new flat rate customers have been accepted since its passage. *Lewis v. Mayor and City Council of Cumberland.*

Company-wide Basis Approved in Authorizing Telephone Rate Increase

THE Indiana Bell Telephone Company has been authorized by the state commission to increase rates. No increases have been made since 1926. On the contrary, a number of reductions in particular rates have already been made.

The cost of pending wage increases would substantially reduce the present return. It was estimated that the increase would allow a rate of return of

about 4.25 per cent to average intrastate plant, about 4.98 per cent to average intrastate plant less 15 per cent of depreciable property for existing depreciation, about 5.93 per cent to average intrastate net plant, and about 6.26 per cent to average net intrastate capital obligations.

Intrastate rates, tolls, and charges, said the commission, can best be examined, determined, and fixed with due regard to the relative interests of the company, its subscribers, and the public on a company-wide basis, with exchanges fairly classified according to the number of stations and without segregation of the company's property, revenues, expenses, profits, or losses as between exchanges. Exchange and toll services, said the commission, are not separate and distinct undertakings. Each supplements and adds to the usefulness and value of the other. Both are but parts of an integrated business operated as a whole in the best interests of the public.

Intrastate toll revenues, said the commission, are related to and depend in part upon the division between the company and its connecting companies of revenue derived from intrastate toll traffic jointly handled by them. This may involve allocation as between the company's intrastate and interstate toll operations of property, revenue, and expense covered by the company's contract with American Telephone and Telegraph Company. The company and connecting companies have by contracts agreed upon the basis of division.

This division is so related to the whole subject of intrastate toll rates, the commission continued, that it is within the jurisdiction of the commission, but the contracts had not been filed and the basis of division provided had not been approved by the commission. Such contracts, it was said, should be filed for commission consideration, approval, disapproval, or modification. Disposition of matters affected by these contracts should be deferred pending filing and consideration. *Re Indiana Bell Telephone Co. (No. 19049).*

Fair Value Is Still the Rate Base Under Maryland Law

THE Maryland commission, in authorizing higher telephone rates, ruled that under the law of the state rates must be predicated on the "fair value" or "upon the value" of property used and useful in rendering service to the public. The commission said it would serve no useful purpose to review and restate the numerous criticisms of the cost of reproduction theory. The question had been elaborately briefed and argued in the present case. The commission said:

> It is not necessary for us to decide whether, as a matter of *constitutional law,* evidence of reproduction cost must be received and considered in fixing rates. We have reached the conclusion that the recent cases to which the other parties refer have not changed the meaning of the Maryland Public Service Commission Law . . . We construe the statute to mean that all of the usual elements relevant to the determination of value of property generally must be received and considered in determining the value for the purpose of fixing rates; in other words, there is no special rule for valuation of property *for rate-making purposes,* which we are advised does, however, obtain in some other jurisdictions.

Higher operating costs made an increase in rates necessary. A return of 5½ per cent was considered fair. The fact that the commission in an accounting case had ordered a pension accrual item to be charged "below the line" was not accepted as a determination of the proper treatment of the item for rate-making purposes.

Argument had been made that the company in computing the periodic payments which it makes into the pension trust fund should have anticipated and provided for the various wage increases and other like items which have occurred since 1937. It was said to be doubtful that the commission or any other regu-

latory body would have permitted the company to speculate as to the amounts of such unknown future events and claim as allowable pension fund expense any amount based on such speculation. The company's claims for pension expense were allowed.

The commission allowed cost of plant under construction and also property held for future use. The rate established, it was pointed out, must be reasonable not only for the present, but also for a reasonable time in the future. *Re Chesapeake & Potomac Telephone Co. of Baltimore City (Case No. 4822, Order No. 43885).*

New Law on Railroad Clearance Does Not Cut Down Commission Power

AN appeal by the representative of a railroad union from a commission order granting a railroad authority to maintain a canopy affording less clearance than prescribed under a general commission order was dismissed by the court of appeals of Kansas City, Missouri.

A contention that, since the Uniform Clearance Law was passed subsequent to the Public Service Commission Law, commission authority was limited over clearance matters was overruled by the commission. A study of the statutes and the arguments which the appellant based on them clearly indicated, the court said, that the clearance statute did not render inoperative the general powers of the commission.

The court pointed out that the rule-making power of the commission, which was not questioned in the proceeding, included the power to alter its rules and determine any reasonable policy of interpretation and application. From this the court concluded that the order waiving enforcement of the clearance regulation was neither unreasonable nor unlawful. *State ex rel. Dail v. Public Service Commission et al. 203 SW2d 491.*

Local Gas Company Exempted

A LOCAL gas company, not otherwise subject to the jurisdiction of the Federal Power Commission, but which might possibly be subject to regulation by reason of a contract to supply gas to a company subject to the commission's jurisdiction, was exempted from that jurisdiction.

The purchasing company was faced with a possible shortage of supply. It was essential for it to afford a measure of protection against line breaks, line freezing, reductions in proration allowances, and other such contingencies. For that purpose it was forced to have a diversity of source and a reasonable surplus of supply and required the availability of this source of gas.

The contract was of short duration, contemplating a temporary condition, but the exemption would be for no longer than the term of the contract. *Re City Service Gas Co. (Docket No. G-898).*

Local Service Subject to State Control

THE Pennsylvania commission has decided that a railroad company must apply to the commission for approval of the abandonment of intrastate service and the abolition of highway crossings. The Erie Railroad, in an investigation on the commission's own motion, asked dismissal of the proceeding

on the ground that the commission was without jurisdiction. The railroad argued that the Interstate Commerce Commission had paramount and exclusive jurisdiction.

The commission held that it has jurisdiction over abolition of crossings located on the line of a railroad which is part of an interstate system, or which is owned by an interstate system, where the Interstate Commerce Commission has approved abandonment of the line, if the state commission has not consented unconditionally to such abandonment.

The jurisdiction of the Interstate Commerce Commission over abolition of service, the commission continued, is not exclusive in a case where the intrastate branch is a part of a system engaged in interstate service.

It was said that the duty imposed on railroad companies to apply to the state commission for approval of discontinuance is not an unlawful burden upon or regulation of interstate commerce. *Pennsylvania Public Utility Commission v. Erie Railroad Co. (Complaint Docket No. 14135).*

Other Important Rulings

THE Civil Aeronautics Board approved an air carrier's application for approval of the transfer of a certificate as in the public interest. The board ruled that the corporate form of the new holder of the certificate would better assure continuity of operation than the partnership status of the former certificate holder. *Re Woodley Airways et al. (Docket No. 2022).*

The United States Circuit Court of Appeals granted a motion of the Securities and Exchange Commission to dismiss a stockholder's appeal from an order approving a plan for reorganization under the Holding Company Act and ruled that the act must be complied with irrespective of state law or stockholder approval. *Okin v. Securities and Exchange Commission et al. 161 F2d 978.*

The Wisconsin commission authorized an increase in telephone rates sufficient to enable the company to meet the interest on long-term debt and notes payable, pay a 5 per cent dividend on the proprietary interest, and amortize debt over a 10-year period. *Waunakee Telephone Co. (2-U-2467).*

A New York court upheld orders of the state commission directing an electric company to transfer from its Account 101—Electric Plant in Service, to another asset Account 105—Electric Plant Acquisition Adjustments, an amount representing an arbitrary percentage calculation of theoretical overheads and assumed organization costs which had been entered upon the company's books in 1928. *Paul Smith's Electric Light & Power & Railroad Co. v. Maltbie et al. 71 NYS2d 681.*

The supreme court of Arizona dismissed an appeal from a judgment which upheld an order of the state commission, on the ground that the appeal was filed before the judgment was entered. An order for judgment had been made before the notice of appeal was filed, but the court held that an appeal could not be taken until judgment was actually entered. *Consolidated Stage Co. v. Corporation Commission et al. 182 P2d 937.*

In dismissing a motor carrier's appeal from a commission decision awarding a certificate to a competitor, the supreme court of Tennessee overruled arguments by the carrier that it would suffer some financial loss from competition. The mere fact that competition might result in some loss in revenue did not support the conclusion that it was contrary to the public interest. *Hoover Motor Express Co., Inc. v. Taylor, 203 SW2d 366.*

NOTE.—The cases above referred to, where decided by courts or regulatory commissions, will be published in full or abstracted in *Public Utilities Reports.*

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Public Utilities Reports

COMPRISING THE MORE IMPORTANT DECISIONS, ORDERS, AND RECOMMENDATIONS OF COURTS AND COMMISSIONS

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¶ *Public Utilities Reports (New Series) are published in five bound volumes annually, with an Annual Digest. These Reports contain the cases preprinted in the issues of* PUBLIC UTILITIES FORTNIGHTLY, *as well as additional cases and digests of cases. The volumes are $7.50 each; the Annual Digest $6.00.*

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PUBLIC UTILITIES REPORTS

MASSACHUSETTS DEPARTMENT OF PUBLIC UTILITIES

Re Boston Consolidated Gas Company

D.P.U. 7710
June 11, 1947

INVESTIGATION *on Department motion of propriety of proposed gas rate schedules; proposed rates approved.*

Rates, § 381 — Competitive fuels — Gas for space heating — Value of service.

1. Testimony as to relative fuel prices is important in establishing the value of gas for space heating, one of the important considerations in arriving at a just and reasonable rate for service, p. 3.

Rates, § 389 — Gas company — Space-heating department.

2. A gas company seeking authority to increase only its rates for space heating must estimate the cost allocable to space-heating service in order to arrive at a net figure for this class of service, p. 3.

Rates, § 389 — Gas for space heating — Basis — Incremental cost.

3. Incremental costs incurred by a gas utility in furnishing space-heating service do not furnish a proper basis for rates for such service, where the company is purchasing high-cost propane gas for peak-shaving purposes and is manufacturing relatively expensive water gas, neither of which costs would probably be incurred without the large requirements incident to house-heating use, p. 3.

Return, § 72 — Gas for space heating.

4. A gas company furnishing gas for space heating as well as other services may not expect to earn the same rate of return on its total investment when it becomes deeply involved in the heating business, since the other users cannot be expected to bear any part of the burden of the low rates forced by competition with other fuels in this field, p. 3.

Payment, § 53 — Prompt payment discount — Gas for space heating.

5. Prompt payment discounts in connection with gas for space heating were deemed justified, although the principle of prompt payment discounts on ordinary household bills was not approved, p. 4.

(McKEOWN, Commissioner, concurs in part.)

APPEARANCE: Robert H. Holt, for Boston Consolidated Gas Company.

By the DEPARTMENT: This is an investigation instituted by the Department under Chap 164 of the General Laws (Ter. Ed.) of certain rates of the Boston Consolidated Gas Company filed to be effective May 1, 1947, and suspended by order dated March 26, 1947, until July 1st. Pursuant to notice, a public hearing was held on May 8th, at which no appearances were noted in opposition to the proposed schedules.

Respondent operates primarily in the manufacture and distribution of water gas and in the distribution of coal gas purchased from Eastern Gas and Fuel Company, though it also operates an electric system in Charlestown, serving about 7,000 meters. It had 305,899 customers' gas meters in service at the end of 1946, about two-thirds in Boston and the rest in the Boston metropolitan area as far out as Groton. As of December 31, 1946, its balance sheet showed a total investment in plant of $51,028,439.85 subject to a depreciation reserve of $9,079,063.54, or 18.46 per cent of its depreciable property. This represents an increase of about 14 per cent over 1940 figures, following the suggestions this Department made in 1939. Re Boston Consolidated Gas Co. (1939) D.P.U. 5744, 30 PUR NS 260. Its common stock account stands at $31,677,600, plus premiums of $640,068.62. It had notes for $9,000,000 outstanding at the end of 1946 and a surplus of $2,049,881.25. Its plant account less depreciation, total capital funds, and property valuation as established by local assessors are all fairly comparable. Its operations in 1946 showed an income balance transferable to profit and loss of $1,041,007.77, representing a return of 3.22 per cent on capital and premium. Its income before deductions for interest, etc., was $1,383,662, which amounts to 3.19 per cent of total capital funds. This percentage has recently shown a consistent decline, being 4.068 per cent in 1944 and 3.753 per cent in 1945. Respondent's expert testified that an average return of 6 per cent was necessary to enable the company to market its securities in the present market, assuming the existing ratio is maintained between debt and other capital funds. It paid dividends in 1946 totaling $2.75 per share on its $100 par value stock.

As is presently the case with a large number of gas utilities, respondent is faced with the problem of increased costs over and above the fuel costs covered by its fuel clause. It estimates its operating revenue on existing rates for 1947 as $16,593,582, an increase of $2,203,929 over 1946, and its operating expenses, depreciation, and taxes as $15,867,929, an increase of $2,574,866. Since the increased cost of gas purchased is covered by the fuel clause, the difference of $370,937 is almost entirely attributable to increased cost of labor and supplies. Such estimates indicate a net revenue for 1947 of $981,817, representing a 2.26 per cent return on invested capital. In this connection, respondent has included two recent wage increases, one in May, 1946, of 11½ cents per hour, and one in February, 1947, of 15 cents per hour. Its average monthly wage in January, 1945, was $224.90,

and in March, 1947, was $241.97. Its total monthly payroll for the same period went from $276,847.10 to $376,274.07, an increase of slightly under 36 per cent. Much of this increase is, of course, due to reconversion to a peacetime basis, although the number of employees is still less than were on the payroll in 1940 and 1941. There is sufficient evidence that this increased expense is necessary in order to provide adequate service.

Comparative figures covering operations for the first three months of 1945, 1946, and 1947 indicate that respondent's estimates are, if anything, conservative. They show net income for the first quarter in 1945 of $443,373.26, in 1946 of $458,468.44, and in 1947 of $238,637.96, or a 48 per cent decrease in net for this period within one year. If this tendency continues at the same rate, respondent will end up the year 1947 with earnings well under those for 1946.

[1] Respondent proposes to increase its space-heating rates alone at this time. It considers that the proposed rates for this service would still meet the competitive situation, due to relative increases in the prices of competing fuels. This testimony as to relative fuel prices is important in establishing the value of the service to respondent's customers, which is one of the important considerations in arriving at a just and reasonable rate for service. Smyth v. Ames (1898) 169 US 466, 42 L ed 819, 18 S Ct 418; Re Milwaukee Gas Light Co. (1943) 51 PUR NS 299. Respondent's space-heating customers comprise 4.23 per cent of the total customers. They use 27 per cent of the respondent's output, and represent 16 per cent of its dollar sales. Of the total estimated use in 1946 by these consumers of 3,565,491 thousand cubic feet, 552,090 thousand cubic feet would not be affected by the proposed increase, since the rates for the initial blocks of these schedules are not changed. It is contemplated to raise $301,341 gross by the proposed increase, which it is estimated will produce $213,399 after Federal income taxes. This would bring the total estimated gross income for 1947 to $1,195,216, assuming the rates to be effective January 1st, representing a return on capital invested of 2.75 per cent, and a net return on par plus premium of well under 3 per cent.

[2–4] It is, of course, necessary to estimate costs allocable to space-heating service in order to arrive at a net figure for this class of service. See Customers v. Worcester Electric Light Co. D.P.U. 2609, PUR1927C 705; Webber on Public Utility Regulation, 81. This, respondent attempted at some length to do and on the basis of these figures, it estimated its total net revenues from heating customers in 1944 at $242,007, in 1945 at $180,428, and a loss of $63.98 in 1946. It estimated its investment for these customers at $4,918,556 in 1944 and $5,552,172 in 1946, or between 11 and 12 per cent of its total plant. It is obvious that this class of customer is not and has not been pulling its own weight (See Re Lynn Gas & E. Co. [1947] D.P.U. 7642, 70 PUR NS —); that the proposed rates are still within the limits of the value of this service to the consumers; and that respondent is adequately justified in confining its present application for increased rates to this type of use.

In this connection, although we be-

lieve it makes little practical difference in this particular case, we feel impelled to point out the fallacy inherent in the assumption sometimes expressed that house-heating rates might properly be considered on an increment basis. This might have been true at one time, and under some circumstances. But it is not true when, as here, respondent is purchasing high-cost propane gas for peak-shaving purposes, and is manufacturing relatively expensive water gas, neither of which costs would probably be incurred without the large requirements incident upon house-heating use. Respondent is currently increasing its peak capacity by about 20 per cent, solely in order to take care of this increased load. Furthermore, as we have pointed out, consumption by this class of customer has soared up to over one-fourth of respondent's total output. Sale of this volume of gas ceases to be incidental to the entire business, and the fact should be frankly faced that it is a substantial part of the company's business, the rates for which are really governed in large measure by competitive factors above, of course, the actual cost of production. As we said in 1939 in D.P.U. 5744, *supra*, 30 PUR NS at p. 269: "We think it may fairly be said that when a class of customers is using such a large quantity of the company's output, the type of use to which the commodity is put cannot accurately be classed as experimental." From this point of view, however, the company should not expect to earn the same rate of return on its total investment when it becomes so deeply involved in the heating business, since the other users cannot be expected to bear any part of the burden of the low rates forced by competition with other fuels in this field. See Re Boston Consolidated Gas Co. (1936) D.P.U. 4885, 12 PUR NS 113, 132, where we said: "Where a company engages in business of a competitive nature and its earnings on the competitive business fail to produce a fair return on that proportion of the property devoted to this competitive business, in our judgment, it ought not to expect to impose the shortage of a fair return on that business on the non-competitive business in order to obtain a fair return on the whole property." Out of fairness to respondent, we should add that it did take substantially this attitude at the hearing, and that these remarks are not intended as any criticism of its presentation of its current revenue needs.

[5] Respondent has included provision in its schedules for prompt payment discounts ranging from about 8 to 10 per cent. In approving the schedules as filed, the Department is not thereby necessarily approving the principle of the prompt payment discounts on ordinary household bills. See Re Boston Consolidated Gas Co. (1938) D.P.U. 5580, 36 PUR NS 378. They feel, however, that there are considerations involved in space heating which are sufficient to justify its use in this particular connection.

With the foregoing considerations in mind, it is the opinion of the Department that the new schedules of rates as filed by respondent will produce no more than a reasonable return on invested capital, are not discriminatory in nature, and ought to be permitted to go into effect.

McKeown, Commissioner, concurring in part except as follows: I

gree with the conclusions reached in his opinion except that I do not agree with the reasoning contained in the first paragraph on page 4. That paragraph appears to me to be superfluous and not relevant to the issue before us. The rates filed relate only to house-heating rates. These rates are being approved. Domestic rates are not before us in this investigation. Hence they do not under this proceeding require deliberative action on the part of the Department.

WISCONSIN PUBLIC SERVICE COMMISSION

City of Two Rivers

v.

Commonwealth Telephone Company

2-U-2009
July 31, 1947; August 5, 1947

COMPLAINT *by municipality against telephone rates; existing rates held excessive and new rates prescribed. For earlier decision, see (1945) 61 PUR NS 503.*

Rates, § 174 — Application of rate of return to rate base.

1. Reasonable rates are not properly arrived at merely by means of a formula whereby a percentage figure, deemed a reasonable rate of return, is applied to another figure which is termed a rate base, p. 8.

Rates, § 2 — Nature of rate making — Exercise of police power.

2. Rate making for public utilities is price fixing through the exercise of police power of government; consequently legal principles applicable to the exercise of eminent domain have no place in rate regulation, p. 9.

Rates, § 124 — Reasonableness — Relationship of profit to value.

3. The relationship between the net profits which any rate schedule will afford a utility and whatever might be substituted for fair value as the proper equivalent of a rate base (whether or not expressed percentage-wise as a rate of return) does not constitute the sole criterion as to either the legality or reasonableness of rates, and is merely one among several facts which are properly considered by regulatory authority in arriving at rates that are, on the whole and in view of all relevant facts as shown, reasonable, p. 9.

Rates, § 120 — Reasonableness as well as legality.

4. The duty of the Commission is not to ascertain rates which will merely escape valid attack upon the claim that they are unlawful, but rather to prescribe rates that will be fair and reasonable in view of the rights and interests of both the utilities and its customers, p. 10.

Rates, § 124 — Determination — Annual net profit.

5. Proper rates may be arrived at, without determining any rate base and without determining any specific figure as constituting a fair rate of return, by prescribing rates which are estimated and intended to afford approximately an annual net profit of a determined number of dollars which the Commission would consider reasonable for the utility to enjoy from the operation of its business, p. 10.

Rates, § 124 — Determination without using rate base or rate of return.

6. Relevant considerations, in the establishment of reasonable rates, without using the rate-base-rate-of-return formula, are (1) an estimate of the reasonable future cost incurred in the furnishing of such service as the public may reasonably be expected to demand from the utility, (2) the value of any class of service where that value constitutes the limitation upon and practical equivalent of the rates charged, and (3) a reasonable profit which it is proper for the utility to enjoy under all relevant facts and circumstances, p. 10.

Rates, § 124 — Cost and value of service — Capital needs.

7. Evidence which should be considered in determining proper rates includes the cost of rendering service and the value of each class of service, the need for expansion of plant and the expenditure which will probably be required therefor and the enlistment of capital for that purpose, as well as the quality and character of service, p. 11.

Return, § 36 — Economy and efficiency as factors.

8. Sound regulation of rates should include a recognition of the fact that a reasonable share of the savings which result from economy and efficiency of operation should inure to the utility and such share should be sufficient to constitute an incentive for continued and further effort directed to such savings, p. 11.

Rates, § 640 — Disposition of complaint by municipality — Subsequent system-wide investigation — Delay of decision.

9. Final decision on a complaint by a municipality against the rates of a telephone company should not be delayed until determination has been made of the fairness of rates of the entire system where the municipal complaint was filed several years before the complaint against the other rates, p. 12.

Return, § 9 — Legality of utility rate — Fair return on fair value.

Discussion of the development of the theory of a fair return on present fair value for determining the legality of rates prescribed for utility service, p. 8.

Rates, § 120 — Reasonableness — Unfairness without confiscation.

Statement that utility rates may be unreasonable even if they are not confiscatory, p. 8.

Rates, § 6 — Method of determination — Eminent domain theory — Independence of state courts.

Statement that a state supreme court can, if it sees fit, adhere to the eminent domain theory of rate making even though it has been discarded by the Supreme Court of the United States, p. 12.

Rates, § 174 — Eminent domain theory of rate making — Position of state court.

Statement that the state courts, in applying the eminent domain theory of

rate making were bowing to, rather than agreeing with, the doctrine of the United States Supreme Court with respect to any determination of the value of utility property in the rate-making process, p. 12.

By the COMMISSION: On December 29, 1945, 61 PUR NS 503, the Commission entered an order in this proceeding prescribing the rates to be charged for the service furnished by Commonwealth Telephone Company by and through the facilities of its exchange at Two Rivers, Manitowoc county. Thereafter Commonwealth Telephone Company duly filed its application for rehearing with respect to the matters determined by said order. The rehearing as requested was granted by order dated February 6, 1946; and rehearing thus granted was held on April 11, 1946, before Commissioner Samuel Bryan, and on February 18, 1947, before Examiner Calmer Browy, at Madison.

APPEARANCES: F. W. Dicke, City Attorney, and John B. Hoffman, City Manager, for city of Two Rivers; Schubring, Ryan, Petersen & Sutherland, by William Ryan, Attorney, Madison, for Commonwealth Telephone Company; H. T. Ferguson, Chief Counsel, Kenneth J. Jackson, Rates and Research Department, and Warren Oakey, Engineering Department, of the Commission staff.

At a hearing held prior to the order of December 29, 1945, *supra,* it was stipulated upon the record by the city of Two Rivers and the Commonwealth Telephone Company that an order, as thus entered, might be made upon the basis of information in the company's annual reports to the Commission and other information in the Commission's files in the light of war conditions then prevailing. The order of December 29, 1945, *supra,* was accordingly not based on any other evidence offered by either party to the proceeding.

The application for rehearing is such a mixture of allegation and argument that it is difficult to state in general terms the grounds upon which the company contends that the order of December 29, 1945, is either unreasonable or unlawful. It is clear, however, that the company contends that the level of the rates prescribed by that order is unreasonably low; that the value of the utility property as found in said 1945 order is erroneous; that the Commission's estimate of future operating expenses of the exchange is also too low; and that the record upon which the 1945 order was made was insufficient.

Upon the rehearing, considerable evidence was presented as to both the present value and the original cost of the property constituting the Two Rivers exchange, and as to the depreciation accrued to that property. No useful purpose would be served by a summary of that evidence here. We think that such evidence, taken as a whole, indicates a somewhat higher value of the property involved than the amount of that value as found in the 1945 order. We do not deem it necessary to determine or find what that value was or is in order to arrive at the rates to be prescribed in this proceeding.

The 1945 order herein, as appears therefrom, was arrived at by a de-

termination of the present fair value of the property used or useful in furnishing the service for which the rates as therein fixed were prescribed; by a determination of a fair rate of return upon a rate base whose equivalent was such present fair value of property; and by designing a schedule of rates, applicable to such service, which was expected to afford to the utility the amount of return—or net annual profit—thus indicated.

[1] However, after careful consideration, we have concluded that reasonable rates are not properly arrived at merely by means of a formula whereby a percentage figure (which is deemed "a reasonable rate of return") is applied to another figure which is termed a rate base.

For many years, following the decision of the Supreme Court of the United States in Smyth v. Ames (1898) 169 US 466, 42 L ed 819, 18 S Ct 418, a "fair return on the present fair value" of utility property constituted the essential test for determining the legality of rates prescribed for the utility service furnished by means of that property. Likewise, in the viewpoint of many regulatory agencies, the fair-return-on-fair-value formula came to be used as the essential basis for determining reasonable rates. The formula and its use were said to be justified because of the doctrine announced in Smyth v. Ames, *supra*, and later adhered to in many later decisions of the Supreme Court of the United States, that rate making was so analogous to the exercise of eminent domain as to be the legal equivalent thereof; and rates which failed to afford such "fair return on fair value" were, in many cases, held by that court to be in violation of the Fourteenth Amendment to the Constitution of the United States because the prescription of such rates amounted to the confiscation of property.

Under the eminent domain theory of rate making, "fair return on fair value" was certainly not an illogical test for determining the legal validity of any rate prescription. It was never a completely logical test as to the reasonableness of rates as prescribed by regulatory authority,—unless such authority was under a legislative mandate to prescribe the "lowest reasonable rates," which the Supreme Court of the United States said were rates which barely escape being confiscatory. This Commission has never been under that mandate.

Nevertheless, this Commission, along with most other similar regulatory agencies, followed a practice of rate making in which "fair return on fair value" was used not merely as a test to determine the legal validity of utility rates, but as constituting, practically speaking, a definition of reasonable rates. The fallacy in this procedure was perhaps not generally perceived until it was clearly pointed out in Wisconsin Teleph. Co. v. Public Service Commission (1939) 232 Wis 371, 31 PUR NS 351, 287 NW 167, that utility rates might be unreasonable even if they could escape a claim of being confiscatory. Even as a test for the legal validity of utility rates, the "fair return on fair value" doctrine was not without its critics, who pointed inexorably to the circuitous logic upon which it was based. The objective of most, if not all, of such critics, was some substitute for "fair value" to which a so-called reasonable "rate of

return" could be applied to obtain rates whose general level could not be successfully attacked upon judicial review as being confiscatory. Most, if not all, of such criticism accepted the eminent domain theory of rate making, which was entirely logical because the Supreme Court of the United States had held in no uncertain terms that *its* inquiry in any rate case began and ended with the question of whether the rates under review were confiscatory.

The controversy over the question of whether "fair value" was the proper equivalent of a rate base persisted for many years until it was finally put to rest—at least from the standpoint of Federal law and the review by the Federal judiciary of utility rate prescriptions—by the decision of the Supreme Court of the United States in Federal Power Commission v. Hope Nat. Gas Co. (1944) 320 US 591, 88 L ed 333, 51 PUR NS 193, 64 S Ct 281. That decision clearly disapproved of "fair value" as the proper equivalent of a rate base; but just as definitely declined to say what that proper equivalent was.

[2] If that were all that was decided by the Hope Case, *supra,* then this Commission, and every other similar agency in the country, would be properly engaged in finding out what is the logical equivalent of a rate base which would eventually be approved as such by the Supreme Court of the United States. But the Hope Case, *supra,* decided more, and of much greater fundamental import, than that "fair value is the end product and not the commencement of the rate-making process." Although the language conveying it is parenthetical, the majority opinion in the Hope Case, *supra,* can leave no doubt but that the court has discarded the eminent domain theory and basis of rate making, as announced in Smyth v. Ames, *supra,* and as followed in a long line of decisions ending with Federal Power Commission v. Natural Gas Pipeline Co. (1942) 315 US 575, 86 L ed 1037, 42 PUR NS 129, 62 S Ct 736; and has gone back to the doctrine as originally announced in Munn v. Illinois (1877) 94 US 113, 24 L ed 77, to the effect that rate making is price fixing through the exercise of the police power of government, and that legal principles applicable to the exercise of eminent domain have no place in rate regulation.

Both the importance and the necessity for determining rate bases and fair rates of return in utility rate regulation arose from and were founded upon the doctrine that rate making by regulatory agencies was an exercise of the right of eminent domain. If rate making is not the exercise of eminent domain, but of the police power, then it must follow that rates prescribed by regulatory authority are never confiscatory, even though they may be so low as to amount to an unlawful exercise of the police power; since the validity of any exercise of the police power cannot be successfully attacked upon the sole ground that it results in a destruction or in a diminution of the value of the property.

[3] Consequently, as we view it, the relationship between the net profits which any rate schedule will afford and whatever might properly be substituted for fair value as the proper equivalent of a rate base (whether or not expressed percentagewise as a "rate of return") no longer constitutes a valid test as to either the legal validity or

the reasonableness of the rates specified in that schedule. We do not mean that such a relationship is without importance or value in determining or viewing the reasonableness of utility rates. But it does not constitute the sole criterion as to either the legality or the reasonableness of such rates, and is merely one among several other facts which are properly considered by regulatory authority in arriving at rates that are, on the whole and in view of all relevant facts as shown, reasonable.

[4] There appears to be no question raised here as to the lawfulness of the rates prescribed by the 1945 order in this proceeding. We are therefore not here concerned—at least directly—with the question of whether the rates prescribed by that order would afford or fail to afford a fair return on the present fair value of the property involved. Our concern, and likewise our task, in this proceeding is not to ascertain rates for the utility before us which will barely escape valid attack upon the claim that they are unlawful, but rather to ascertain and prescribe rates that will be fair and reasonable in view of the rights and interests of both the utility and its customers. That duty, as we view it, is not properly discharged by determining the "lowest reasonable rates," in the sense of the definition of that term by the United States Supreme Court as meaning rates barely sufficient to escape a claim of confiscation, or as meaning rates whose level would be barely sufficient to escape a charge that they constituted an abuse of the police power.

[5] The rates which we shall prescribe in this proceeding are accordingly not arrived at by ascertaining what the level of them would have to be to afford any given percentage relationship between the net profit, or "return" thereunder, and the value of the utility property involved—whatever that value might be under the evidence before us. Nor are those rates arrived at by a modification of that method whereby something other than "present fair value" is adopted as the proper equivalent of a rate base. In other words, we have not substituted original cost, original investment, or either of them, after subtracting depreciation or depreciation reserve, for present fair value as constituting the proper equivalent of a rate base. The rates herein prescribed are arrived at without determining any rate base, and without determining any specific figure as constituting a "fair rate of return" on anything that may be claimed to be a proper rate base. The rates herein prescribed are estimated and intended to afford approximately an annual net profit of a determined number of dollars which we think it reasonable for the utility to enjoy from the operation of its business.

[6] Accordingly, there will be a determination and finding of neither a rate base nor of a rate of return for the purposes of this proceeding. That is not to say, however, that the rates herein prescribed will be arrived at by guesswork or the mere application of an intuitive sense of justice. While the rates so prescribed are in no sense the mathematical or other result of the application of any formula or combination of formulas, there are certain considerations which constitute the essential basis for the prescription of rates as herein made. Those considerations are:

(1) An estimate of the reasonable future cost incurred in the furnishing of such service as the public may reasonably be expected to demand from the utility here involved.

(2) The value of any class of that utility's service, where that value constitutes the limitation upon and practical equivalent of the rates charged therefor.

(3) A reasonable profit which it is proper for the utility to enjoy under all relevant facts and circumstances.

The first two considerations, as above stated, have always been taken into account by the Commission in previous rate cases, and no different treatment or application of such considerations is present in this proceeding than has been given or made in many instances heretofore.

[7] In arriving at what we consider to be a proper or allowable profit for the utility here involved, we have taken into consideration such facts and circumstances as are presented by the evidence and have weighed each of them in the light of all of them, but not considering any one of them as constituting a determining criterion as to the amount of profit which the rates, as prescribed, should be designed to afford. Thus, we have considered the evidence as to both the cost and the value of the property involved, the cost of rendering the service and the value of each class of service, the need of the utility for expansion of its plant and the expenditure which will probably be required therefor and the enlistment of capital for that purpose, as well as the quality and character of the utility's service.

[8] Sound regulation of utility rates, as we view it, should include a recognition of the fact that a reasonable share of the savings which result from economy and efficiency of operation should inure to the utility and such share should be sufficient to constitute an incentive for continued and further effort directed to such savings. Perhaps the most valid criticism of rate making by the strict application of the "fair return" formula is that too little incentive to economy in plant construction or to efficiency in operation results from rates thus arrived at.

Prior to the close of the rehearing in this proceeding, the Commission advised the utility that although the fair value of the utility's property was not without relevance and importance with respect to the rates to be prescribed herein, those rates would not be arrived at by a strict application of the "fair return on fair value" formula. This advice was given because, as we view it, the "fair return on fair value" theory of rate making has been disapproved by the Supreme Court of the United States, whose previous decisions were responsible for that theory and the rate-making methods which sprang from it. Counsel for Commonwealth Telephone Company in its brief urges, in effect, that even though the theory just mentioned may have been discarded by the United States Supreme Court, it has not been discarded by the supreme court of the state of Wisconsin, and that under the law of Wisconsin, therefore, rates which fail to afford a fair return on the present fair value of property are still confiscatory.

As we read the decisions of our supreme court, it adhered to the "fair return on fair value" doctrine with respect to utility rate making only be-

cause that doctrine had been laid down by the Supreme Court of the United States, and because a failure to meet the calls of that doctrine resulted in a rate order which could be set aside as confiscatory under the Fourteenth Amendment of the Constitution of the United States.

Of course, our supreme court can, if it sees fit, adhere to the eminent domain theory of rate making even though it has been discarded by the Supreme Court of the United States which, in effect, imposed that doctrine upon all state courts and legislatures. We do not think our supreme court, of its own volition, would now insist upon or impose that doctrine. It seems clear to us from the decision in Waukesha Gas & E. Co. v. Railroad Commission, 191 Wis 565, PUR1927B 545, 211 NW 760, that our court was bowing to, rather than agreeing with, the doctrine of the Supreme Court of the United States with respect to any determination or use of the value of utility property in the rate-making process. Certainly, the legislative requirement of § 196.05, Wisconsin Statutes, directing the valuation of utility property, cannot be construed as constituting anything more than a recognition of the necessity of complying with Federal law as it unquestionably existed at the time of the enactment of that section in 1907—only ten years after the decision in Smyth v. Ames, *supra*, and while the doctrine of that case was in full force and effect.

In any event, there is no question before us here as to the legality of the rates prescribed in the 1945 order. Since the rates herein prescribed are designed to afford a larger profit than the rates thus previously prescribed, there is and can be no question of confiscation here involved. Certainly, our supreme court has never announced any doctrine of its own to the effect that "fair return on fair value" is the essential criterion either for arriving at reasonable rates or for judging the reasonableness of rates however arrived at.

After the close of the hearing held on February 18, 1947, Commonwealth Telephone Company, under date of April 3, 1947, filed a motion or request for a reopening of the hearing in this proceeding. Pursuant to that request, hearing was held on April 21, 1947, before Commissioner Bryan. At this hearing, Commonwealth Telephone Company presented further testimony which has been considered but need not be summarized here.

Also, at the hearing held on April 21st as aforesaid, the company moved to consolidate the above-entitled proceeding with another proceeding, docketed 2-U-2390, instituted by a petition or complaint of Commonwealth Telephone Company with respect to the rates charged for the service furnished by all of its exchanges. This motion was denied by the Commission and the parties were duly advised of the Commission's decision to that effect.

[9] This proceeding was instituted in 1945 by complaint of the city of Two Rivers. It would not be proper to delay that final decision further to await the Commission's investigation and determination in what may be termed the system-wide proceeding above referred to, even though it is conceivable that the rates for the Two Rivers exchange, as herein prescribed, might require some modification as a result of the

investigation and determination that will be made in that system-wide case. The subscribers of the company served by its Two Rivers exchange are entitled, in accordance with the determination herein made, to a reduction in their rates and that reduction should not properly be further delayed, particularly in view of the fact that the application in the system-wide case was not made until long after the 1945 order was entered in this proceeding.

In accordance with the foregoing discussion, the prescription of rates hereinafter made is based on several considerations, one being an estimate of the reasonable future cost incurred in connection with the furnishing of service and also the reasonable profit which is proper for the utility to secure.

Consideration of future costs and profits involves a review of past costs and profits.

Tabulated below is an income account for the Two Rivers exchange as set forth in the annual reports of the company for the years 1942 to 1946, inclusive, together with a projected income account for the year 1947 which was submitted by the company.

	1942	1943	1944	1945	1946	1947 Projected
Operating Revenues						
Local Service	$48,087.25	$51,465.76	$57,747.47	$62,354.51	$68,724.17	$72,101.67
Toll Service	10,096.48	15,735.58	18,243.48	20,121.37	22,502.93	24,289.10
Miscellaneous	1,051.41	590.79	690.02	787.35	976.09	1,164.83
Uncollectibles, Dr.	97.71	20.76	30.39	13.59	27.66	27.66
Total Oper. Rev.	$59,137.43	$67,771.37	$76,650.58	$83,249.64	$92,175.53	$97,527.94
Operating Expenses						
Maintenance	$9,127.44	$7,723.46	$10,475.17	$13,039.29	$16,235.95	$24,208.00
Traffic	5,492.92	6,038.01	7,661.64	8,845.27	10,761.97	12,376.27
Commercial	4,156.94	4,299.55	5,231.68	5,706.82	8,829.65	9,154.10
Gen. Office Sal. & Exp.	4,031.15	4,732.30	6,149.61	8,109.23	9,271.84	10,662.61
Other Oper. Exp.	2,132.41	2,692.98	2,971.78	4,464.99	5,303.40	6,098.91
Depreciation	9,533.79	9,704.57	11,290.55	11,801.15	12,246.98	11,175.88
Amortization of Intangible Property	226.33	226.33	226.33	226.33	226.33	226.33
Taxes	8,056.93	12,522.50	15,524.77	14,773.10	10,983.26	8,859.69
Total Oper. Exp.	$42,757.91	$47,939.70	$59,531.53	$66,966.18	$73,859.38	$82,761.79
Net Operating Income	$16,379.52	$19,831.67	$17,119.05	$16,283.46	$18,316.15	$14,766.15

It is to be noted that although revenues and expenses have increased materially from 1942 to 1946, inclusive, net operating income or profit, on the other hand, has remained relatively constant. This fact is particularly important when giving consideration to the projected income account for 1947 which was presented by the company as a forecast of future revenues and expenses. Actual operating results during the five years indicate in a conclusive way that increased revenues have been sufficient to cover increased expenses, and that the company forecast of a sharp decrease in net operating income or profit due to anticipated increased expenses is not supported by recent past experience. Such experience adjusted to reflect certain and known conditions applicable only to future operations will serve as a basis for determining the level of future profits from operation.

We turn now to consideration of the reasonableness of the operating ex-

penses reported by the company in 1946, and the use of such expenses in forecasting the future level of expenses. In this connection, consideration must be given to the extent to which increased expenses will be offset by revenues received from additional business.

The evidence submitted indicates that maintenance expense during the past year, including 1946, has been somewhat low. As will be noted, traffic, commercial, general office, and other expenses have in most cases doubled between 1942 and 1946. This fact, together with the evidence which has been submitted, indicates that additional maintenance costs will be experienced in the future. Mr. W. F. Sloan, an independent engineer engaged by the company, presented evidence to the effect that regular maintenance expense should amount to $17,845 per year, and that deferred maintenance expense on central office equipment should amount to about $2,000 more. Mr. W. O. Treetin, chief engineer of the company, testified that from $1,200 to $1,500 of deferred maintenance expense was picked up on central office equipment in 1946. There are also indications in his testimony that additional deferred maintenance on the other classes of plant is included in 1946 maintenance costs. He also testified that additional maintenance employees were added in 1947. This, of course, would not be reflected in the 1946 costs. After taking all of these factors into consideration, it is estimated that future maintenance expense will approximate $18,000 per year. This is $1,764 more than actual maintenance expense in 1946.

While the 1947 projected expenses of the company indicate increased traffic, commercial, general office, and other general expenses, the basis of such estimate is a statement by an officer of the company that he expects such expenses to be about 15 per cent in excess of those experienced in 1946. The basis of his estimate is not indicated but if it is predicated upon additional costs because of additional business, which appears to be the case, it is our opinion that the additional revenue from increased business will cover any increased expenses that may be experienced in these categories.

The depreciation expense as shown in the 1946 income account is arrived at by the application of a 5 per cent factor to the average book depreciable plant accounts. The depreciation expense set forth in the 1947 projected income account is arrived at by the application of a factor of 3.8 per cent applied to telephone plant in service as of December 31, 1946, as per books, plus telephone plant under construction and telephone plant which the company expects to construct sometime during 1947. The amount to which the 3.8 per cent is applied is not important. The basis of the 3.8 per cent is important.

Depreciation expense reported by the company in 1946 applicable to the Two Rivers exchange is in excess of amounts derived from application of the company's duly certified depreciation rates. Section 196.09 (5), Statutes, provides:

"When the Commission shall have established, by certification or order, the reasonable and proper percentages of depreciation, such percentages shall constitute the percentages to be used in any proceeding involving the rates or practices of such public utility, pro-

vided that if at the time of such proceeding it is found that the percentages of depreciation previously established are no longer reasonable and proper the Commission shall establish reasonable and proper percentages for the purpose of such proceeding and certify such new percentages in the manner provided by this section."

Application of the certified rates of the company to average depreciable property as of December 31, 1946, results in a composite rate of 3.32 per cent. As a basis for changing the certified rates applicable at Two Rivers, Mr. W. F. Sloan submitted evidence to the effect that a factor of 3.8 per cent applied to depreciable property would result in a reasonable amount of depreciation expense. Mr. Sloan's estimate of 3.8 per cent fails to indicate the class rates which go to make up the composite rate. Because of this fact, it cannot be applied under the circumstances of this case.

The company has recently completed construction of certain underground-conduit plant which is now in service and the depreciation thereon should likewise be considered in giving consideration to costs in the future. This construction amounts to $38,934. The present certified rate for underground conduit is 1.7 per cent. The inclusion of this amount of property in the certified rate will reduce the composite rate from 3.32 per cent to 3.11 per cent. This has the effect of decreasing the composite rate. In our opinion it would be unreasonable to estimate future depreciation expense by the application of Sloan's composite rate to such a long-life property. The company, in the 1947 projected income account, actually includes the underground-conduit investment and depreciation expense at the composite rate of 3.8 per cent.

Since the underground-conduit investment has been made, we have included the depreciation expense as a future cost of operation. The certified rates have been applied to the balance of the average depreciable property, which has the effect of reducing the depreciation expense shown in the 1946 income account from $12,247 to $8,754.

After giving effect to income tax changes resulting from the above adjustments, a reasonable future income account would be as follows:

Operating revenues	
Local service	$68,724
Toll service	22,503
Miscellaneous service	976
Uncollectible, Dr.	28
Total operating revenues	$92,175
Operating expenses	
Maintenance	$18,000
Traffic	10,762
Commercial	8,830
General office salaries & expenses	9,272
Other operating expense	5,303
Depreciation	8,754
Amortization of intangible property	226
Taxes	11,509
Total operating expenses	$72,656
Net operating income or profit	$19,520

Attached hereto as Appendix A is a prescription of rates which is intended to allow this utility a profit of approximately $12,500 on its annual operations. This is considered a reasonable profit under all relevant facts and circumstances. Attention is directed to the fact that although the rates herein prescribed will reduce charges to customers slightly in excess of $10,000, the income tax saving will reduce the net operating income of the utility by about $7,000.

While the net profit of approximate-

ly $12,500 was not arrived at by the use of any formula or combination of formulas, we have checked such estimated profit with the evidence before us as to the present fair value of the property involved, the amount of investment in that property, and the estimate of gross operating revenue under the rates as prescribed. We have also considered the quality of the service furnished by the company at its Two Rivers exchange in comparison with the quality of service furnished generally by all telephone utilities operating throughout Wisconsin. And we have taken into account the amount of profit from this exchange which is required not only to enable the company to continue in the rendition of adequate service to the portion of the public involved, but such further amount of profit as, in our view, will afford an adequate reward for the service involved and likewise the incentive to further economy and efficiency in the operation of the property employed in the rendition of that service.

The Commission finds:

1. That the existing rates applicable to the service furnished by Commonwealth Telephone Company by and through the facilities of its Two Rivers exchange afford an excessive profit to said utility and are therefore unreasonable.

2. That the rates herein prescribed for such service are just and reasonable.

The Commission Therefore Concludes:

That an order prescribing rates for such service as herein fixed should be entered.

ORDER

It is therefore *ordered:*

1. That the schedule of rates attached hereto as Appendix A be made applicable to the service furnished by Commonwealth Telephone Company by and through the facilities of its Two Rivers exchange, such rates to be effective for service furnished subsequent to the first billing date following the date of this order.

Appendix A

Class of service	Per month Gross	Net
Business		
One-party	$3.75	$3.50
Two-party	3.00	2.75
Rural	2.50	2.25
Residence		
One-party	2.50	2.25
Two-party	2.25	2.00
Four-party	1.75	1.50
Rural	2.00	1.75
Switched		
Dial		1.00
Other		
PBX manual		.90
PBX dial		1.35
Handset—local	No charge	
Handset—rural	No charge	

Order Modifying Previous Order

The attention of the Commission has been directed to certain mechanical difficulties involved in the compliance by Commonwealth Telephone Company with the provisions of the order entered in the above-entitled proceeding under date of July 31, 1947. That order provides that the rates therein prescribed shall be effective "for service furnished subsequent to the first billing date following the date of this order." It appears that under the rotation system of billing employed by Commonwealth Telephone Company at its Two Rivers exchange the rates prescribed in said order of July 31st will be effective for some service rendered by the company by and through its Two Rivers

xchange on August 6, 1947. The ompany represents, and we agree, that ull compliance with the order is, there- ore, impossible.

The original order in this proceeding rovided that the rates therein pre- cribed should be effective "on the first illing date following thirty days after he date of this order." In view of the echanical difficulties involved, we hink the order of July 31st should ave the same provision with respect to he effective date thereof as was pro- vided in the original order made under date of December 29, 1945, 61 PUR NS 503.

ORDER

It is therefore *ordered:*

That the order in the above-entitled proceeding made under date of July 31, 1947, be and the same is hereby modified so as to read as follows:

1. That the schedule of rates attached hereto as Appendix A be made applicable to service furnished by Commonwealth Telephone Company by and through the facilities of its Two Rivers exchange, such rates to be effective for service furnished subsequent to thirty days after the first billing date following the date of this order.

MASSACHUSETTS DEPARTMENT OF PUBLIC UTILITIES

Re Worcester Gas Light Company

D.P.U. 7643
May 29, 1947

INVESTIGATION *by Department upon its own motion as to propriety of proposed gas rate increase; rate increase approved as amended in accordance with opinion.*

Rates, § 146 — Reasonableness — Increased costs.

1. The only source from which a public utility company's increased labor and material costs may be paid is from the rates to consumers, p. 19.

Return, § 16 — Right to earn.

2. A public utility company is entitled to receive a fair return on its property, and no more, p. 19.

Rates, § 146 — Reasonableness — Inadequate return.

3. A public utility company may increase its rates where, by reason of deeply increased costs, its return is no longer fair and reasonable, p. 19.

Return, § 92 — Gas company.

4. A gas rate increase was authorized where it would bring the company's estimated return on par, premium, and surplus to about 5.05 per cent, and on par and premium to about 6.4 per cent, with the resulting net income from these rates representing about 4.65 per cent on plant account less depreciation, p. 20.

APPEARANCES: George R. Stobbs, for Worcester Gas Light Company; Thomas J. Barry, Town Counsel, for town of Northbridge.

By the DEPARTMENT: This is an investigation commenced on December 20, 1946, by the Department on its own motion under Chap. 164, § 94 of the General Laws (Ter. Ed.), of the propriety of certain proposed rates of Worcester Gas Light Company. The respondent filed schedules, effective February 1, 1947, which were suspended by the Department until July 1st, and which provide for general increases throughout its existing rate structure. A public hearing was held on February 4, 1947.

The Worcester Gas Light Company manufactures water gas and supplied 56,652 customers' meters as of December 31, 1946, in the city of Worcester, the towns of Framingham, Natick, and Needham and 19 other adjacent towns. It showed a plant account at that time of $10,560,650.37, a depreciation reserve of $1,947,837.27, or about 19.23 per cent of depreciable property. Its capital account shows $3,195,600 in common stock, $850,680 in premium account, $3,900,000 in bonds and long-term notes, and surplus of $1,096,220. Under the provisions of § 13 of Chap 164 of the General Laws (Ter. Ed.) it is obvious that any substantial financing of respondent in the near future must be done at least in large measure by means of junior securities. Respondent paid dividends in 1946 of 4 per cent on its capital stock, representing dividend requirements on stock now outstanding of $127,824. It is wholly owned by New England Gas and Electric Association, which fact resulted during the year in savings on consolidated tax returns of $18,920, which was correctly reflected in net earnings. See Re Lowell Gas Light Co. D. P. U. 7641, Dec. 20, 1946.

The Worcester Company, as is the case of gas companies generally, has reported a continual increase in sales during and since the end of the war. However, the increase in gross revenue,. amounting to $1,098,857 between 1941 and 1946, has been largely offset by increases in operating expenses of $1,029,043. The net earnings of the respondent available for interest and dividends have increased from $241,056 in the year 1941 to $349,416 in the year 1946. New schedules of rates effective January 1, 1942, estimated to increase the revenues of the company $116,000, were approved by the Department and contributed in large part to the improvement shown in revenues and net earnings. (D.P.U. 6532.) The application in 1942 (D. P. U. 6532) of a fuel clause on all bills of the company has resulted in substantial increase in gross revenues but is not reflected in net revenues as it has only absorbed and offset increased costs of fuel.

The net earnings available in 1946 for interest and dividends of $349,416 represent a return of 4.06 per cent on the plant investment of the company less accrued depreciation. Earnings after interest available for dividends in the amount of $177,332 for that year represent a return of about 4 per cent, after adjustments, on the capital stock plus premium as these accounts stood at the end of the year.

Respondent has showed very substantial increases in its operating costs

uring 1946, which were on the way o at the end of the year, and sub- antial commitments which will be ffective during the current year. By xtending its 1946 figures through pplication of costs at the end of 1946, espondent arrives at an adjusted net evenue for 1946 of only $42,322, rep- esenting a return on equity capital nvested of less than one per cent. It stimates that it will collect by the pro- osed schedules an additional gross evenue of $338,200, or a net after axes of $223,506, which would result n a total net return to respondent of 265,828, or 5.17 per cent on par, remium, and surplus, and of some- hing less than 6.6 per cent on par plus remium account. And it should be oted that the 1946 figures used in- lude a substantial nonoperating rev- nue from merchandising and jobbing perations in the amount of $45,303, hich may be and probably will be in arge measure nonrecurring. Fur- hermore, respondent's estimate of arnings may be reduced since it esti- nated 1947 municipal taxes on the asis of 1946 rates, which is turning ut to be a far from accurate assump- ion. Respondent's proposals seem to s to be adequately modest in view of he efficient operation and conserva- ive policies of the company and of the eavy increase in costs with which it s faced.

[1–3] The largest portion of re- pondent's increased estimated expense s attributable to increased labor costs f $110,200 under a contract negotiat- d in November, 1946. During the eriod 1942 to date, the respondent's mployees have benefited by general ncreases across the board aggregating 3 cents an hour, or $280,500 in gross expense. The balance of the increased costs affecting prospective revenues are attributable to a 40 to 50 per cent increase in prices of materials and sup- plies, or an amount of between $90,- 000 and $100,000. Without delving into debatable grounds of economic policy, we feel impelled to point out that there is no magic fund in a public utility out of which increased costs for labor or materials may be paid. Its accounts are public property, its man- agement salaries, its profits, and div- idends are matters of record, and the only source from which increased costs may be paid is from the rates to con- sumers. Nowhere are the operations of the immutable laws of economics better or more openly demonstrated. This Department is required to see that capital receives a fair return, and no more, on its property. If that re- turn is decreased by steeply increased costs to the point where it is no longer fair and reasonable, we are required to see that the rates charged to the public for its service are correspond- ingly increased. These propositions are firmly embedded in the organic law of this country. See McCardle v. Indianapolis Water Co. 272 US 400, 71 L ed 316, PUR1927A 15, 47 S Ct 144, and cases cited.

Although the earnings of the com- pany have been such that a dividend of over 6 per cent on the par value of the company's stock could have been paid in each of the last five years, the dividend payments have been as fol- lows: 2 per cent in 1942; 4 per cent in 1943; 5 per cent in 1944; 4 per cent in 1945, and 4 per cent in 1946. Approximately $394,000 in earnings were left in the company during this period. The expanding load of the

company has required the construction of additional plant, and the use of these funds together with depreciation funds has tended to keep at a minimum the necessity for financing. However, it is now estimated by the company that in order to meet the future requirements of its customers an additional minimum amount of $1,600,000 will be expended during the next four years on the production plant, on holders, and on the mains of the company. Its officers stated that, were they to have a free hand in improvement and extension of service, they would budget over $2,600,000 for this purpose, but have compromised for the lesser amount because of the difficulty in raising capital in such quantity. The expenditure of these amounts will require outside financing. This need for financing, together with increased labor and material costs are given as the reasons for the filing of the proposed new schedules.

The proposed schedules were computed on a fundamental basis of increasing all rates about 10 per cent. However, in accordance with the principles which we have hitherto approved (see Re Boston Consolidated Gas Co. [1939] D. P. U. 5744, 30 PUR NS 260; Re Lynn Gas & E. Co. [1947] D. P. U. 7642, 70 PUR NS 22) the rates applicable to general users provide for a heavier increase in the first step of 100 cubic feet, affecting the so-called "convenience" user to a greater extent proportionately than the normal household user, and bringing his contribution more nearly in line with the costs attributable to him. Respondent's figures show that more than 69 per cent of its bills are for use between 500 and 3,000 cubic feet per month, and that the ordinary domestic customer (31.45 per cent of its bills) uses between 1,000 and 2,000 cubic feet per month.

[4] Respondent originally provided in its proposed schedules for a discount of 5 per cent on its bills for payment within ten days, in accordance with its historical policy. Since the hearing, its management has drawn up and submitted a simplification of its proposed schedules. The modified schedules which have been suggested by respondent, and which will be ordered into effect, are estimated to yield additional net revenue to the company over 1946 figures of $217,282, bringing its estimated return on par, premium, and surplus to about 5.05 per cent, and on par and premium to about 6.4 per cent. The net income resulting from these rates would represent about 4.65 per cent on plant account less depreciation.

Careful study and consideration convince us that the respondent is competently and efficiently managed, that the filed schedules as amended in accordance with this opinion are reasonably designed to suit the company's operations, and that the additional revenue sought by the respondent is required in order to give it a fair return on its property and to allow it to continue to give adequate service.

Therefore, after due notice and public hearing, and full consideration, it is hereby

Ordered: That the schedules of the Worcester Gas Light Company filed December 16, 1946, and suspended by order of the Department until July 1, 1947, being M. D. P. U. No. 57—General Service, M. D. P. U. No. 58—Optional Rate, M. D. P. U. No.

59—Optional Domestic Kitchen Heating, M. D. P. U. No. 60—Domestic Space Heating Rate, M. D. P. U. No. 61—Commercial-Industrial Service, M. D. P. U. No. 62—Industrial Off-Peak Baking Rate and M. D. P. U. No. 63—Fuel Cost Adjustment, be and the same are hereby approved to be effective June 5, 1947, except that the provision in each of such schedules, except M. D. P. U. No. 63, entitled "Prompt Payment Discount" is ordered stricken out, and further except that the following rates shall be inserted in the respective schedules in place of those originally filed, preserving, however, demand charges where indicated and all other rates and provisions not hereby expressly superseded:

M.D.P.U. No. 57—General Service

	First Zone	Second Zone
First 100 cubic feet	$.95	$1.20
Next 200 cubic feet, per 100 cubic feet	.21	.21
Next 1,200 cubic feet, per 100 cubic feet	.15	.15
Over 1,500 cubic feet, per 100 cubic feet	.13	.13

M.D.P.U. No. 58—Optional Rate

	First Zone	Second Zone
First 100 cubic feet	$.95	$1.20
Next 200 cubic feet, per 100 cubic feet	.21	.21
Next 1,200 cubic feet, per 100 cubic feet	.15	.15
Next 8,500 cubic feet, per 100 cubic feet	.08	.08
Over 10,000 cubic feet, per 100 cubic feet	.065	.065

M.D.P.U. No. 59—Optional Domestic Kitchen Heating

	First Zone	Second Zone
First 100 cubic feet	$.95	$1.20
Next 200 cubic feet, per 100 cubic feet	.21	.21
Next 1,200 cubic feet, per 100 cubic feet	.15	.15
Over 1,500 cubic feet, per 100 cubic feet	.065	.065

M.D.P.U. No. 60—Domestic Space Heating Rate

	First Zone	Second Zone
First 100 cubic feet	$.95	$1.20
Next 200 cubic feet, per 100 cubic feet	.21	.21
Next 1,300 cubic feet, per 100 cubic feet	.15	.15
Next 1,400 cubic feet, plus 33⅓ times the "Hourly Use", per 100 cubic feet	.09	.09
Next 3,000 cubic feet, plus 100 times the "Hourly Use", per 100 cubic feet	.065	.065
All in excess, per 100 cubic feet	.06	.06

M.D.P.U. No. 61—Commercial-Industrial Service

Commodity charge:	First Zone	Second Zone
First 100,000 cubic feet, per 100 cubic feet	$.10	$.10
Next 200,000 cubic feet, per 100 cubic feet	.075	.075
Next 2,200,000 cubic feet, per 100 cubic feet	.065	.065
Next 2,500,000 cubic feet, per 100 cubic feet	.06	.065
Over 5,000,000 cubic feet, per 100 cubic feet	.055	.065

M.D.P.U. No. 62—Industrial Off-Peak Baking Rate

	First Zone	Second Zone
First 3,000 cubic feet, per 100 cubic feet	$.15	$.15
Next 497,000 cubic feet, per 100 cubic feet	.085	.085
Next 500,000 cubic feet, per 100 cubic feet	.065	.065
Over 1,000,000 cubic feet, per 100 cubic feet	.055	.065

MASSACHUSETTS DEPARTMENT OF PUBLIC UTILITIES

Re Lynn Gas & Electric Company

D.P.U. 7642
May 19, 1947

INVESTIGATION *on motion of Department as to propriety of rates of gas and electric company; approved in part and disapproved in part.*

Rates, § 144 — Small users — Burden of cost.

1. Customers using less than 30 kilowatt hours of electric current, who are usually apartment house or convenience users, should pay a reasonable charge for availability of service, p. 23.

Rates, § 197 — Gas and electric company — Burden of cost.

2. A gas and electric company's class rates must be such that each class will pay its own costs, and where gas service is supplied at the expense of the users of electric service, it is necessary to revamp the rate structure to minimize this anomaly, p. 24.

Payment, § 53 — Gas and electric rates — Net basis.

3. A gas and electric rate schedule providing for payment on a net basis only was deemed desirable, p. 25.

Rates, § 288 — Schedules — Minimum charge.

4. The establishment of a rate schedule which would, as a practical matter, be little used, for the sole purpose of enabling the company to apply another minimum to its usual rate, was disapproved in principle, p. 25.

Rates, § 303 — Gas and electric company — Scope of fuel clause.

5. A gas and electric company may not extend its fuel clause to apply to all domestic electric users over the initial one-dollar step, p. 26.

APPEARANCE: John L. Hannan, for Lynn Gas & Electric Company.

By the DEPARTMENT: This is an investigation by the Department on its own motion under G. L. (Ter. Ed.) Chap 164, § 94, of the rates and charges of Lynn Gas and Electric Company for gas and electricity. The respondent filed new schedules of rates on December 17, 1946, which were suspended by order of the Department under G. L. (Ter. Ed.) Chap 164, § 94, until May 1st and subsequently until June 1st.

The respondent is a combination gas and electric company, operating a gas and electric business in a heavily industrial area in the city of Lynn and in the towns of Swampscott, Saugus, and Nahant and a gas business only in the towns of Marblehead, Lynnfield, and a part of the city of Peabody. The company furnished as of December 31, 1946, electric service to 43,471 customers' meters and gas service to 44,-

126 customers' meters. Its annual return to the Department for 1946 showed a total capitalization of $11,544,731.25, consisting of $4,095,000 of common stock, $6,149,731.25 in premium account, and $1,300,000 in 15-year unsecured 2¾ per cent notes, due in 1958. The surplus of the company on December 31, 1946, total $3,300,036.03, of which amount $2,025,763.74 was reported as invested in plant. The return further shows as of the same date a plant investment in the electric department of $14,075,653.95, with accrued depreciation thereon of $4,031,343.84, and a plant investment in its gas department of $5,875,261.83, with accrued depreciation thereon of $2,284,782.46. For the year 1946, it reported net earnings available for dividends on electricity of $883,196.11, and on gas of $185,270.72, a total of $1,068,466.83, representing a return on capital stock plus premium account of 10.43 per cent. The combined earnings available for interest and dividends were $1,107,021.74, or 8.12 per cent, on the combined plant investment less the depreciation reserve. The company has for a number of years paid annual dividends of $5 a share on its $25 par stock, which has a current market value of about $100 per share. The total annual dividend requirements on the outstanding stock are $819,000 at this $5 rate.

A public hearing was held on January 28, 1947. No one appeared in opposition to the proposed new rates at this hearing. However, from protests filed with the Department since the hearing, it is evident that there is a widespread impression that the proposed rates of respondent represent a general increase to the company. The fact is, that the estimates originally proposed on the basis of a projected 12-month revenue from August, 1946, indicated a net increase in revenues to the company from the proposed rates of $28,789. It appeared at the hearing, however, that the net revenue effect of the proposed rates as applied to *actual* 1946 figures was a decrease of about the same amount, i.e., $28,000. The respondent's proposals, therefore, clearly constitute a *readjustment* of rates as between its classes of customers, and do not represent an increase in earnings to the company.

[1] In this connection, the impression also seems to be generally current that the electric rates of the respondent are extremely high. This is not true under either the existing or proposed rates, except for very large household users, having electric bills of $10 a month or more, representing less than one per cent of the customers of the company. At average household use of up to 100 kilowatt hours, including over 84 per cent of the monthly bills, respondent's existing rates are lower than those in effect in many other cities in the commonwealth. These bills are not effected more than 3 or 4 cents by the proposed schedules, except for bills for less than 30 kilowatt hours of use, affecting about 10 per cent of respondent's bills. It seems proper that these users, who are usually apartment house or convenience users, should pay a reasonable charge for the availability of such service. See Re Boston Consolidated Gas Co. (1939) D.P.U. 5744, 30 PUR NS 260. The charges to domestic customers using in excess of 150 kilowatt hours per month, who receive 5 per cent of respondents' bills, will be de-

creased under the proposed schedules. The effect of the proposed schedules of domestic electric rates is forcefully shown in the following tabulation, prepared on the basis of $7.80 coal:

Kw. Hr.	Net Cost Present Rate Sch. A	Cost Proposed Rate Sch. A	Increase or Decrease	No. Bills Rendered	% Total Bills	Cum. % Total Bills
10	$.75	$1.00	$.25	15,226	3.52	
20	1.23	1.38	.15	32,286	7.45	10.97
30	1.78	1.85	.07	42,427	9.76	20.73
40	2.28	2.32	.04	47,426	10.92	31.65
50	2.78	2.79	.01	50,093	11.51	43.16
60	3.09	3.11	.02	48,968	11.32	54.48
70	3.40	3.43	.03	43,501	10.12	64.60
80	3.72	3.74	.02	36,212	8.40	73.00
90	4.03	4.06	.03	28,131	6.50	79.50
100	4.34	4.38	.04	21,187	4.85	84.35
125	5.12	5.18	.06	31,127	7.18	91.53
150	5.90	5.86	—.04	16,351	3.77	95.30
175	6.68	6.53	—.15	7,531	1.74	97.04
200	7.46	7.21	—.25	4,508	1.04	98.08
250	8.77	8.56	—.21	4,130	.95	99.03
300	10.07	9.91	—.16	1,827	.42	99.45
350	11.38	11.26	—.12	904	.21	99.66
400	12.69	12.60	—.09	454	.11	99.77
500	15.31	15.30	—.01	507	.12	99.89
500	(Over)			373	.09	99.98

[2] The outstanding feature of the presentation to the Department of respondent's evidence was the introduction of accurate cost analysis figures. The competitive aspects of the gas business were forcibly brought out in this study. A survey of the major domestic gas appliances on the company's system showed that out of approximately 35,400 ranges served by the company 19,600 were straight gas ranges and 15,800 were combination gas and oil ranges. In other words, the survey showed the company in direct competition with oil for the cooking and to some extent the water-heating load of over 40 per cent of its gas customers.

From the figures presented in the cost study, it appears that in this company, as is unquestionably true in other companies furnishing more than one utility service, the customers using one type of service have been carrying those using the other. It appears that a reasonable analysis of the electric and gas business divides the net revenues under existing rates at about 93 per cent electric and 7 per cent gas, whereas plant investment and working capital are found to be 69 per cent electric and 31 per cent gas, and gross operating revenues for the year 1946 are divided about 73 per cent electric and 27 per cent gas. Under the rates as proposed, it was estimated that the net revenues would approximate 78 per cent from electric service and 22 per cent from gas, which would bring these net revenue figures more nearly in line with investments and costs.

As the company's expert who testified at the hearing in the instant case readily admitted, it is unnecessary and in many cases undesirable that a rate schedule be designed slavishly to follow costs, since many other factors must be taken into consideration in rates in addition to costs. But it is equally apparent that "the respective class rates

must be such that each class will pay its own costs."

Leffler: The Value of Cost Analysis to Management. Consequently, when a careful and detailed cost analysis has been made, as in this case, which demonstrates that gas service is being given to the customers of the respondent at the expense of the users of electric service, it becomes necessary to revamp the rate structure to minimize this anomaly.

Generally speaking, a very high percentage of the customers of any combination company are users of both gas and electricity. Where, however, as is the case with the Lynn Company, both types of service are not supplied in all portions of the company's territory, it is doubly apparent that it is the company's responsibility to fix rates on both types of service so that neither will be a burden on the other. This, and this alone, the respondent is attempting to do on this application.

Actually, on 1946 operations the proposed electric schedules effect an estimated reduction of $222,225 in the base rates. The application of the fuel clause on the basis of fuel costs at the time of estimate makes the net reduction in revenues $158,187. The increase in the base gas rates is estimated at $21,981, but the application of the fuel clause brings the increase in revenue from gas customers to the estimated $176,341. The fuel clause is operative as fuel costs increase and decrease, therefore these estimates will move up and down with fuel costs. Any substantial change in fuel costs will necessarily change the estimates substantially.

The principal increase in the proposed domestic gas rate is contained in the first step of the company's schedule. The company proposes to charge one dollar for the first 200 cubic feet as compared to a charge of 75 cents in its present schedule. With the addition of the fuel charge the bills of domestic gas customers will contain varying increases depending on the monthly use up to 4,000 cubic feet. Customers using over 4,000 cubic feet monthly will get a reduction in their bills.

[3] The schedules as filed by the respondent quote its rates on a net basis only. We feel this is a desirable step. We have very recently approved schedules of other companies which contain similar changes. Re Lowell Gas Light Co. D.P.U. 7641, Dec. 20, 1946.

[4] Respondent filed two schedules, Schedule A–1, Domestic Electric Rate, and Schedule I, Domestic Gas Rate, which were openly admitted by the respondent at the hearing to be designed to meet the minimum charge legislation embodied in G. L. Chap 164, § 119. These schedules apply the statutory minimum 12-month charge of $7 for gas and $9 for electricity. The only rate schedules which would, as a practical matter, be applied in billing stipulate a minimum charge of one dollar per month. We disapprove in principle of the establishment of a rate schedule which will, as a practical matter, be little used for the sole purpose of enabling the company to apply another minimum to its usual rates. The respondent's officers agree that the net revenue loss to it resulting from abandonment of these schedules would only be about $5,000, and have indicated their willingness that such schedules be disallowed, and it will be so ordered.

[5] The respondent's present rates apply a fuel clause to domestic electric use of over 50 kilowatt hours. It proposes in this filing to extend this fuel clause to apply to all domestic users over the initial one dollar step. This is the only company in the commonwealth which is now applying a fuel charge on its domestic electric rates. It now realizes about $28,000 from such a clause, and would realize about $28,000 more in revenue by the proposed extension.

The following table shows the charges at a coal cost of $7.80 as at present collected, as they are proposed and as they would appear without a fuel clause at various usages, to include over 95 per cent of respondent's bills:

Kw. Hr.	Present Schedule A	Proposed Schedule A	Base Rate
10	.75	1.00	1.00
20	1.23	1.38	1.36
30	1.78	1.85	1.81
40	2.28	2.32	2.26
50	2.78	2.79	2.71
60	3.09	3.11	3.01
70	3.40	3.43	3.31
80	3.72	3.74	3.61
90	4.03	4.06	3.91
100	4.34	4.38	4.21
125	5.12	5.18	4.96
150	5.90	5.86	5.59

Testimony was introduced at the hearing indicating estimated increased costs for 1947 of $335,000 over comparable figures for 1946, on the basis of which an estimate was arrived at of net income of $960,882 for 1947. Assuming these figures to be accurate forecasts, if the respondent's earnings are further diminished by $56,000, representing loss through absence of the fuel clause on the Domestic Electric Rates, it would still realize net earnings on its combined operations of better than 8.8 per cent on capital stock plus premium account and earnings available for interest and dividends of nearly 7 per cent on depreciated plant account. However, the respondent's operating results from sales of electricity for the first quarter of 1947 indicate an even better prospect than was then presented, and show an increased net revenue which would still more adequately sustain a lower charge to its domestic customers than is contained in the proposed rates. We do not approve of the extension of the use of fuel clauses as requested by the company, and we will order the proposed Schedule A to be modified accordingly.

The company has indicated a desire for a technical change in M.D.P.U. 91 based upon certain practical difficulties in changing over. We see no harm in postponing the cancellation of the present Schedule C to permit respondent to cope with these difficulties and we will so provide.

Re Panhandle Eastern Pipe Line Company

Opinion No. 152, Docket Nos. G-807, G-620
July 3, 1947

PROCEEDING *relating to supplementary agreement for sale of natural gas by a pipe-line company; supplement permitted to become effective and former order modified.*

Service, § 332 — Wholesale natural gas — Variable decrease in volume — Emergency.

A supplemental agreement filed by a natural gas pipe-line company, providing for a variable decrease in volume of gas which the company is obligated to deliver to another company on a firm basis under its rate schedule, although providing for a change in firm service without a corresponding change in rates and charges, may, when for a temporary period, be permitted to become effective where it appears that there is a pressing emergency supply situation on the pipe-line company's system which requires an immediate determination of the gas requirements of its customers.

By the COMMISSION: On October 10, 1946, Panhandle Eastern Pipe Line Company ("Panhandle") filed with the Commission a supplementary agreement, dated July 30, 1946, entered into with The Ohio Fuel Gas Company ("Ohio Fuel") as a rate schedule relating to natural gas service and designated by the Commission as Panhandle Supplement No. 2 to Rate Schedule FPC No. 108.[1]

The supplemental agreement of July 30, 1946, provides for a variable decrease in the volume of natural gas which Panhandle is obligated to deliver to Ohio Fuel on a firm basis under Rate Schedule FPC No. 108. The determination of volumes to be delivered above 25,000 thousand cubic feet under the supplemental agreement rests in the sole discretion of Panhandle. The effect as to such variable quantities of gas would be the charging of firm service rates for natural gas which is not firm, thereby establishing rates and charges to Ohio Fuel higher than rates and charges demanded by Panhandle from others for service subordinate to firm service.

By order issued November 6, 1946, the Commission suspended Supplement No. 2 to Panhandle Rate Schedule FPC No. 108 until April 9, 1947, "and until such time thereafter as such

[1] Rate Schedule FPC No. 108 is a contract dated February 9, 1945, relating to the furnishing of natural gas by Panhandle to Ohio Fuel. This agreement provided for the delivery of 25,000 thousand cubic feet of natural gas per day for a period of twenty years, and another 25,000 thousand cubic feet per day for the period of the war emergency but not to exceed five years. The agreement with respect to the latter mentioned volume was made terminable upon ninety days written notice by either of the parties after the period of the war emergency.

supplement shall be made effective in the manner prescribed by the Natural Gas Act."

On June 30, 1947, Panhandle filed with the Commission a motion requesting that the aforesaid Supplement No. 2 to Rate Schedule FPC No. 108 be permitted to go into effect in accordance with the provisions of § 4 (e) of the Natural Gas Act, 15 USCA § 717c(e). In its motion, Panhandle also requests the Commission to grant such approval as may be required by the provisions of Par (B) of the Commission's order granting a certificate of public convenience and necessity issued March 31, 1945, in Docket No. G–620, with Opinion No. 121, in Re Panhandle Eastern Pipe Line Co. 4 FPC 263, 272–274, 59 PUR NS 38.[2]

At the time of the issuance of our opinion and order in Docket No. G–620 the public convenience and necessity required that we retain some reasonable degree of control over the future use of the then proposed facilities, and our order was conditioned accordingly.

During the past year Panhandle, due to its inability to increase its system capacity, has found it necessary to curtail firm and interruptible gas deliveries to its customers.[3] Among the customers affected by such curtailments was Ohio Fuel, deliveries to which were reduced not only below the quantities specified in Rate Schedule FPC No. 108, but even below the volumes provided for by Supplement No. 2 to such rate schedule.

We are still of the opinion that Supplement No. 2 to Panhandle's Rate Schedule FPC No. 108, by its terms provides for a change in service to Ohio Fuel without a corresponding change in rates and charges. Under ordinary conditions we would not consider the disposition of the suspension proceeding without hearing. We are, however, mindful of the temporary nature of the proposed change, for Supplement No. 2 to Rate Schedule FPC No. 108 is intended by the parties to be terminated on April 15, 1948.

There is a pressing emergency supply situation on Panhandle's system which requires an immediate determination of the natural gas requirements of its customers. In view of the circumstances in this proceeding and the temporary nature of the proposed change, it appears that it may be in the public interest to permit Supplement No. 2 to Panhandle's Rate Schedule FPC No. 108 to become effective and to terminate the suspension proceeding, and, also, to modify the Commission's order of March 31, 1945, in Docket No. G–620, *supra*, for the period during which the supplementary rate schedule is proposed to be effective, or, until April 15, 1948.

[2] Paragraph (B) of the order of March 31, 1945, provides as follows:

"(B) This certificate is granted upon the express conditions that (1) the facilities herein authorized shall not be used for either the transportation or sale of natural gas, subject to the jurisdiction of this Commission, to any new customers of Applicant except upon specific authorization first obtained from this Commission, and (2) Applicant shall not abandon or terminate any service rendered by means of such facilities to The Ohio Fuel Gas Company without first obtaining the approval of the Commission in accordance with the requirements of the Natural Gas Act, notwithstanding any provisions for termination of deliveries contained in the contract between applicant and The Ohio Fuel Gas Company, dated February 9, 1945" (4 FPC at p. 273, 59 PUR NS at p. 46).

[3] Such curtailments were made in accordance with emergency service rules and regulations accepted by orders of the Commission. See orders of December 12, 1946, April 23, 1947, and June 24, 1947, Docket Nos. G–200 and G–207.

Wherefore, in view of the foregoing, the Commission *orders* that:

(A) Panhandle's Supplement No. 2 to Rate Schedule FPC No. 108 be and the same hereby is permitted to become effective as of June 30, 1947.

(B) The proceeding instituted by the Commission's order of November 5, 1946, Docket No. G–807, be and the same hereby is terminated.

(C) Paragraph (B) of the Commission's order of March 31, 1945, in Docket No. G–620, 4 FPC 263, 273, 59 PUR NS 38, 46, be and the same hereby is modified so as to permit Panhandle to make deliveries of natural gas to Ohio Fuel until April 15, 1948, in accordance with Panhandle's Supplement No. 2 to Rate Schedule FPC No. 108.

NEW MEXICO PUBLIC SERVICE COMMISSION

Re Sacramento Corporation

Case No. 186
July 18, 1947

PETITION *for increased rates for liquefied petroleum gas; granted.*

Public utilities, § 78 — Liquid gas company.

1. A corporation engaged in the distribution and sale of liquefied petroleum gas for public consumption is a public utility within the meaning of the Public Utility Act, p. 30.

Rates, § 92 — Jurisdiction of Commission — Liquefied petroleum gas.

2. Rates for liquefied petroleum gas service, together with rules and regulations affecting charges, are subject to the jurisdiction of the Commission, p. 30.

Depreciation, § 56 — Liquefied gas business.

3. A depreciation allowance not to exceed 3.43 per cent of total gas plant in service was approved in the case of a corporation engaged in the distribution and sale of liquefied petroleum gas, p. 30.

Valuation, § 309 — Working capital — Relation to operating expense — Gas.

4. Working capital of a company engaged in the distribution and sale of liquefied petroleum gas was allowed at an amount equal to one-eighth of total operating expenses, in addition to allowances for materials and supplies, prepayments, and petty cash allowances, p. 31.

Valuation, § 23 — Recognition of reproduction cost — Addition to original cost.

5. An allowance of 5 per cent of cost of gas plant was included in the rate base to reflect consideration of reproduction cost, p. 31.

Return, § 92 — Liquid gas company.

6. An annual rate of return of between 6½ per cent and 7½ per cent on the rate base of a company engaged in the distribution and sale of liquefied petroleum gas was held to be reasonable, p. 31.

By the COMMISSION: A petition was filed on June 2, 1947, by the Sacramento Corporation, a New Mexico corporation, as required under § 43, Chap 84, Laws of 1941, for an increase in rates applicable to gas service being furnished to applicant's gas consumers in Alamogordo, New Mexico. Notice of hearing was sent to all parties at interest, as required under Rule No. 27 of the Commission's Rules of Practice and Procedure, and in addition was published in the Alamogordo News, a newspaper of weekly circulation in Alamogordo, Otero county, New Mexico.

No petition or protest against the application herein was received by the Commission before or at the time of hearing held in room 29, State Capitol, Santa Fe, New Mexico, at 10 o'clock, A. M., on June 26, 1947.

The Commission, for the purposes of this order, finds that:

[1] 1. The Sacramento Corporation (hereinafter referred to as "Applicant"), a New Mexico corporation, is engaged in the distribution and sale of liquefied petroleum gas for public consumption in the town of Alamogordo, New Mexico, and, therefore, Applicant is a public utility within the meaning of the Public Utility Act;

[2] 2. The rates and charges demanded, observed, charged, and collected by Applicant for liquefied petroleum gas, together with the rules, regulations, practices, and contracts affecting such rates and charges, are subject to the jurisdiction of this Commission under the Public Utility Act;

3. Applicant submitted testimony to the effect that net revenues for the year 1946 were inadequate to cover the cost of operation and provide a reasonable return of Applicant's investment;

4. Applicant's annual report for the year 1946, filed with the Commission, is subject to adjustments in Operating Expenses, due to improper division of General and Miscellaneous Expenses. Depreciation charges for the year 1946 are considered excessive. Adjustments in rates of depreciation are therefore in order to bring such charges in line with depreciation requirements. Taxes charged to Gas Operations were likewise improperly charged, and adjustments should be made to equalize these charges applicable to gas operations. The amounts chargeable to these accounts after adjustment are as follows:

Operating Expenses	$35,441.20
Depreciation	1,182.56
Taxes	2,049.86

5. The Gas Plant in Service was carried on Applicant's books as of December 1, 1946, at $35,080.84. This represents an investment of approximately $88.36 per customer;

6. Depreciation has been accrued at an excessive rate up to and including the year 1946. Applicant's books reflect a balance as of December 1, 1946, in this account of $11,374.16, which is 32.42 per cent of Gas Plant in Service as of that date. No adjustment is considered necessary in this account at this time, as the amounts accrued in the past have been included as an expense of operation and considered in Operating Revenue Deductions made from year to year in determining gross income for all the years Applicant has been in business;

[3] 7. The rate of depreciation, for the purpose of accruing depreciation beginning with January 1, 1947, should be adjusted so as not to exceed

3.43 per cent of the Total Gas Plant in Service;

[4, 5] 8. A proper and reasonable allowance for Working Capital in the rate base, for purposes of this order, is not more than $4,430.15. This amount is one-eighth of the total Operating Expenses adjusted for the year 1946 of $35,441.20;

9. An allowance of $1,754 is considered reasonable and proper in the consideration given by the Commission to Reproduction Cost;

10. An allowance of $1,156.51 for Materials and Supplies and $5.45 for Prepayments is considered just and reasonable for the purpose of this order, as these amounts represent the average monthly balances for the year for these two items;

11. An allowance of $250 is considered reasonable for Petty Cash requirements, to take care of payments not regularly made by check covering small bills and to provide funds for change in the payment of customers' bills;

12. For the purpose of this order, a reasonable rate base for Applicant as an assembled whole and as a gas utility is not more than $31,302.79, as shown by the following tabulation:

Cost of Gas Plant in Service		$35,080.84
Less Existing Depreciation		11,374.16
Total Investment in Gas Plant in Service		$23,706.68
Add:		
5% of $35,080.84 as Allowance for Reproduction Cost	$1,754.00	
Materials & Supplies	1,156.51	
Prepayments	5.45	
Cash Allowance, Petty Cash	250.00	
Working Capital—⅛ of total Operating Expenses, $35,441.20	4,430.15	
Total Additions		$7,596.11
Valuation for Rate Base		$31,302.79

[6] 13. An annual rate of return of between 6½ per cent and 7½ per cent on $31,302.79 is a fair and reasonable return for Applicant;

14. The company's Operating Revenues in 1946 total $39,764.25;

15. Applicant's estimate of increased expenses for 1947 of $3,035 is reasonable and should be allowed, which is made up of the following:

Labor	$435.00
Increased cost of fuel	2,600.00
	$3,035.00

16. For the purposes of this order, the amount of not more than $41,708.62 is a fair and reasonable allowance for Expenses for 1947, as shown by the following tabulation:

Operating Expenses	$38,476.20
Depreciation	1,182.56
Taxes	2,049.86
Total	$41,708.62

17. Applicant's Operating Revenues less deductions for proper operating revenue deductions in 1947 will exceed 1946 revenues by at least $1,944.37;

18. The present rates and charges made, demanded, or received by the Applicant for and in connection with its distribution and sale of liquefied petroleum gas for public consumption are inadequate to meet the present cost of service and to allow a reasonable return on Applicant's Gas Plant in Service based upon anticipated operations cost during the test year 1947;

19. The liquefied petroleum gas rates and charges of the Applicant subject to the Commission's jurisdiction should be increased by not less than $4,123.76 as hereinafter provided.

Wherefore, the Commission *orders* that:

(a) The rates and charges made, demanded, or received by the Applicant

for and in connection with the distribution and sale of liquefied petroleum gas for public consumption shall be so increased as to reflect, when applied to the 1947 sales, an increase of not less than $4,123.76 above 1946 operating revenues of $39,764.25 received from such sales;

(b) Applicant shall file on or before August 1, 1947, a new schedule of rates and charges for or in connection with its sale of liquefied petroleum gas for public consumption, which shall reflect the increase in gross operating revenues ordered in paragraph (a) above, which new schedule of rates and charges shall be effective as to all bills regularly rendered on or after August 1, 1947;

(c) The new schedule of rates and charges shall provide for a reduction in the discount presently allowed on residential consumers' bills of 10 per cent to 5 per cent on bills above the minimum charge and the application of 5 per cent on bills for commercial consumers in excess of the minimum charge which commercial billing has not previously been subject to any discount. These schedules shall conform to the following:

Domestic Service:

First 5 therms	$1.50 minimum bill
Next 5 therms	.17 per therm
Next 10 therms	.12 per therm
Next 10 therms	.11 per therm
All over 30 therms	.08 per therm

Discount: Monthly bills of all consumers using more than such minimum amount and such minimum charge of $1.50 per month shall be subject to a five per cent (5%) discount if paid within ten (10) days after the rendition of such customers' bills, but such minimum charge of $1.50 shall not be subject to such discount.

Commercial and Industrial Service:

First 60 therms or less ..	$6.00 minimum bill
Next 840 therms	.08 per therm
All over 1,000 therms ..	.075 per therm

Discount: Monthly bills of all consumers using more than such minimum amount and such minimum charge of $6 per month shall be subject to a 5 per cent discount if paid within ten days after the rendition of such customers' bills, but such minimum charge of $6 shall not be subject to such discount.

(d) On and after the effective date of the new schedule of rates and charges filed and made effective in accordance with paragraph (c) above, the company shall cease and desist from making, demanding, or receiving any rates and charges which do not reflect the increase ordered in paragraph (a) above. Applicant is ordered to file new rate schedules as required under § 6 of the Commission's General Order No. 2, in keeping with the rates approved in paragraph (c) above, on or before August 1, 1947;

(e) Depreciation accounting shall be established immediately, as provided in § 9, page 10, of the Uniform System of Accounts prescribed for gas utilities under the Commission's General Order No. 8 dated December 1, 1941;

(f) The rate of depreciation to apply on depreciable gas plant and property in service shall not be in excess of 3.43 per cent per annum;

(g) This order shall be without prejudice to any further investigation or action the Commission may deem necessary or desirable.

(h) This order shall not be construed as an acquiescence by this Commission in any estimate or determination of cost, or any valuation of property, claimed or asserted by Applicant.

Industrial Progress

A digest of information on new construction by privately managed utilities; similar information relating to government owned utilities; news concerning products, supplies and services offered by manufacturers; also notices of changes in personnel.

$12,000,000 Program Announced By Lone Star Gas

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This book contains illustrations, description, capacity ratings, and list prices of all their standard gas conversion burners for furnaces and boilers. It also shows many types of special burners, jets, and accessories for commercial and industrial applications, as well as pressure regulators and many automatic control devices. It includes charts and tables of special value to heating engineers, dealers and gas authorities.

Barber Gas Burner Company has been in business for over 30 years and is recognized as a leader in the design, development, laboratory testing, and manufacture of all types of burners for any kind of gas fuel. This new catalog is available to interested persons upon request to the company, providing the applicant mentions the type of burner which he needs.

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Among the materials offered in the campaign are an educational booklet on the relationship between light and sight; two customer booklets, on modernizing existing lighting, and planning the lighting for new homes; six direct mail folders; a booklet illustrating the advantages of planned lighting to the home builder; a large-size home lighting visualizer; three lecture demonstrations; a series of newspaper advertisements, and a planned lighting recommendation form, for use by the lighting representative.

Copies of the residential lighting plan book, with a complete set of the supporting promotional materials, are available to utility commercial executives at the Edison Electric Institute, 420 Lexington avenue, New York 17, New York.

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pendability, handling speed, low operating cost, safety for workers, and freedom from noise, fumes, and odors.

A discussion of basic requirements of mechanized material handling systems, and the importance of continuity once the flow of materials is mechanized, begins the text. Cartoon illustrations point up the main factors in industrial truck selection.

$1,000,000 Program to Promote Sale of Gas Ranges

GAS utilities, dealers, and manufacturers are joining in a $1,000,000 campaign to promote the sale of automatic gas ranges under sponsorship of the American Gas Association, according to the association.

The drive calls for an expediture in three months of $200,000 by the AGA for national magazine advertising, upward of $600,000 by utilities and dealers in local advertising, and the remainder by individual range manufacturers.

Chas. T. Main Moves To Larger Offices

CHAS. T. MAIN, INC., Boston, well known engineering organization has moved to new and larger quarters on the fifteenth floor of the Chamber of Commerce building, where they are consolidating their Boston offices.

$55,394,340 Project Proposed By El Paso Natural Gas

EL PASO NATURAL GAS COMPANY, El Paso, Texas, has filed an application with the Federal Power Commission for permission to construct and operate a $55,394,340 project to supply 200,000 cubic feet additional natural gas daily for California.

The project calls for a 26-inch transmission loop line extending 438 miles which would increase by 100,000,000 cubic feet per day the delivery capacity of a previously authorized line from Lea county, New Mexico, to the Colorado river near Blythe, California. Construction of the proposed facilities is planned to begin in 1951.

Cochrane Continuous Blowoff Systems

A NEW 16-page publication (No. 4410) has been released by Cochrane Corporation, describing five different flash-tank and heat-exchanger systems for recovering the otherwise wasted heat in boiler blowoff water. The flash principle permits regeneration of low pressure steam for feedwater or plant heating. Remaining heat in the concentrated blowoff water is transferred to incoming feedwater through a heat exchanger. Multiple tanks may be used for flashing of steam at different pressures. Two pages are devoted to describing

Show This to Your Medical Department

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No Liquid Reagents — No External Heating

REFERENCE: Blatherwick, N. R., and Dworkin, Joseph H.: A Rapid Test for Albumin and Sugar in the Same Measured Sample of Urine, J. Lab. & Clin. Med. 32: 1042, August 1947. From the Biochemical Laboratory of the Metropolitan Life Insurance Company

(*Reprints of this article will be sent on request*)

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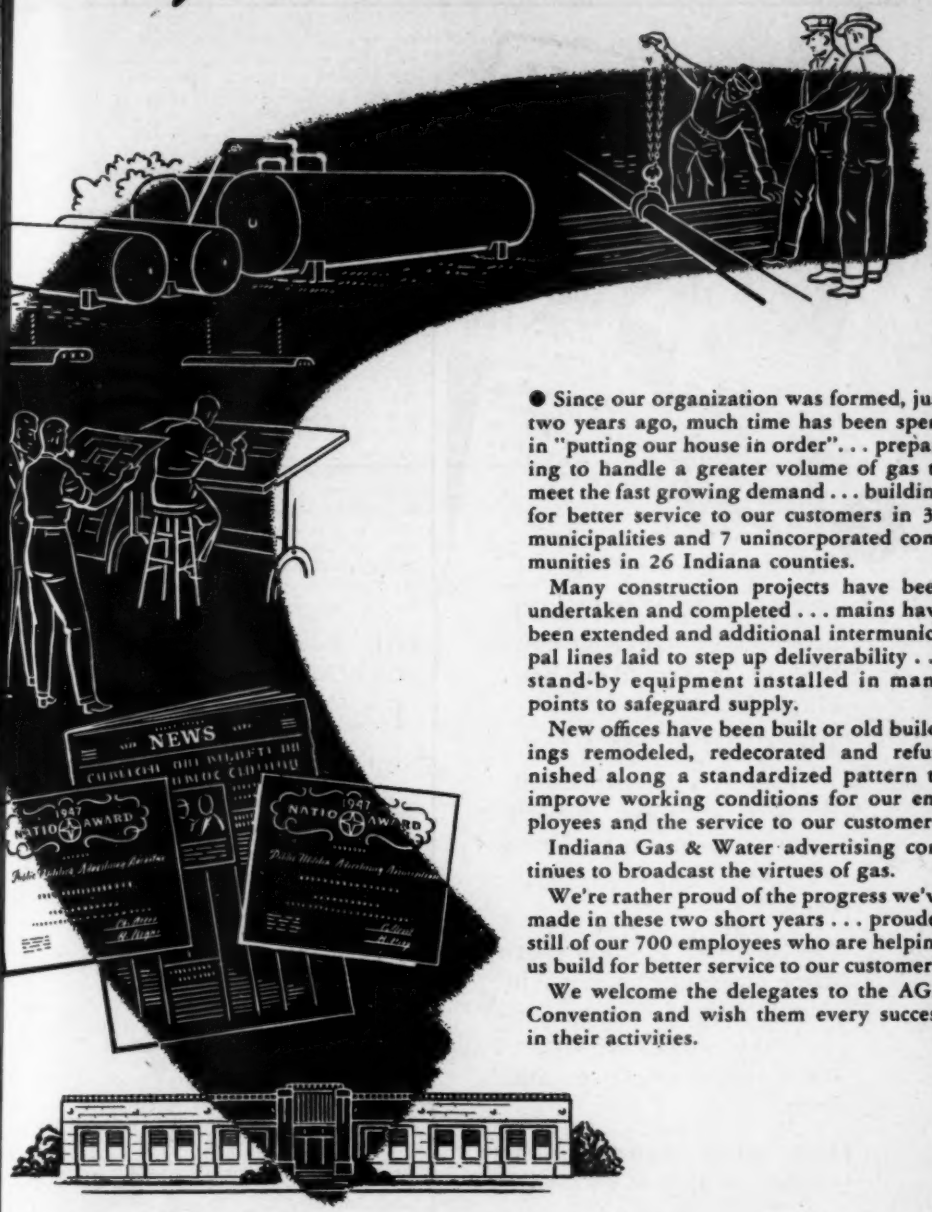

● Since our organization was formed, just two years ago, much time has been spent in "putting our house in order"... preparing to handle a greater volume of gas to meet the fast growing demand... building for better service to our customers in 35 municipalities and 7 unincorporated communities in 26 Indiana counties.

Many construction projects have been undertaken and completed... mains have been extended and additional intermunicipal lines laid to step up deliverability... stand-by equipment installed in many points to safeguard supply.

New offices have been built or old buildings remodeled, redecorated and refurnished along a standardized pattern to improve working conditions for our employees and the service to our customers.

Indiana Gas & Water advertising continues to broadcast the virtues of gas.

We're rather proud of the progress we've made in these two short years... prouder still of our 700 employees who are helping us build for better service to our customers.

We welcome the delegates to the AGA Convention and wish them every success in their activities.

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the detailed calculation of savings under actual plant conditions; a quick-estimating chart is provided for quick calculations of dollar-savings possible together with a roughly estimated cost of equipment. Two thermostatically controlled systems are described for automatically proportioning the rate of blowoff to makeup water. Copies of the publication may be secured from Cochrane Corporation, 17th street & Allegheny avenue, Philadelphia 32, Pennsylvania.

Plans Propane Gas Stand-by Plant

THE KOKOMO, INDIANA GAS & FUEL COMPANY announced recently plans to put a new $100,000 propane gas stand-by plant in operation before the end of this year. Ed M. Hahn, president of the company, said the new plant is another step in a $500,000 expansion and rehabilitation program started by the company in 1946.

The program includes completion this year of construction of a new 8-inch gas transmission pipe line between Tipton and Kokomo, Ind., at a cost of $150,000. Another $150,000 was spent extending gas mains and the installation of new booster pipe lines and regulator stations—other improvements are planned for later this year and early next year.

G-E Furnishing High-Voltage Switching Unit for Tidd Plant

THE highest voltage power switching unit ever built will be furnished by General Electric for installation on a 500-kv experimental transmission line test project sponsored by the American Gas and Electric Service Corporation near the Tidd plant at Brilliant, Ohio, according to an announcement by the General Electric Company.

The huge, high-voltage protective equipment will consist of a power circuit breaker with pneumatic operating mechanism, isolating disconnecting switches, lightning arresters, and bushing-type current transformers. All these components will be interconnected and assembled on a supporting framework as an integrated switching unit.

The impulse power circuit breaker is of low-oil-content construction, and will incorporate design improvements to handle more efficiently the higher voltage of the Tidd test project.

B. A. Johnson Opens Office in Chicago

B. A. JOHNSON, who recently resigned from Minneapolis-Honeywell Regulator Company, has moved to Chicago to become active in administrative and consulting work. Mr. Johnson's immediate association will be with Condensation Engineering Corporation and Barney Olson, Inc.

Condensation Engineering Corporation designs, manufactures, and does application engineering on "Vitroliner" flues and chimneys. Barney Olson, Inc., is one of the oldest manu-

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facturers' representatives and service organizations for quality gas equipment in the Chicago area. Both companies are located at 122 South Michigan avenue where Mr. Johnson will make his headquarters.

Prior to joining Honeywell in 1942, Mr. Johnson was associated with The Peoples Gas Light and Coke Company as a staff engineer and later its sales engineering manager in the domestic sales department where he became widely known for his work on gas heating equipment problems.

Westinghouse Appointment

THE appointment of P. T. Lagrone, manager, customer section, central station sales department, Westinghouse Electric Corporation, East Pittsburgh, Pennsylvania, has been announced by T. Fort, manager, central station sales department.

Construction Loans Announced

CONSTRUCTION loans — chiefly for distribution lines, system improvements or new or additional generating capacity — recently were made to the following enterprises by the Rural Electrification Administration:

South Central Arkansas Electric Coöperative, Arkadelphia, Ark., $195,000.

Suwannee Valley Electric Coöperative, Live Oak, Fla., $440,000.

Clarke Electric Coöperative, Osceola, Iowa, $590,000.

Bossier-Rural Electric Membership Corporation, Bossier, La., $180,000.

Oceana Electric Coöoperative, Hart, Mich., $75,000.

Roseau Electric Coöperative, Roseau, Minn., $490,000.

Border Counties Power Coöperative, Warroad, Minn., $125,000.

Farmers Electric Coöperative, Chillicothe, Mo., $280,000.

Grundy Electric Coöperative, Trenton, Mo., $545,000.

Se-Ma-No Electric Coöperative, Mansfield, Mo., $420,000.

Big Horn County Electric Coöperative, Lodge Grass, Mont., $160,000.

Pitt and Greene Electric Membership Corporation, Farmville, N. C., $51,000.

Slope Electric Coöperative, New England, N. D., $250,000.

Codington-Clarke Electric Association, Watertown, S. D., $400,000.

Bartlett Electric Coöperative, Bartlett, Tex., $160,000.

Bailey County Electric Coöperative Association, Muleshoe, Tex., $350,000.

New Era Electric Coöperative, Athens, Tex., $100,000.

Northern Neck Electric Coöperative, Warsaw, Va., $140,000.

Pioneer Electric Coöperative, Greenville, Ala., $565,000.

Mitchell County Electric Membership Corporation, Camilla, Ga., $485,000.

Harrison County Rural Electric Coöperative, Woodbine, Iowa, $380,000.

South Louisiana Electric Coöperative Association, Houma, La., $153,000.

O and A Electric Coöperative, Newaygo, Mich., $125,000.

Webster Electric Coöperative, Marshfield, Mo., $390,000.

Chimney Rock Public Power District, Bayard, Neb., $158,000.

Davidson Electric Membership Corporation, Lexington, N. C., $195,000.

Horry Electric Coöperative, Conway, S. C., $500,000.

West River Electric Association, Wall, S. D., $125,000.

San Bernard Electric Coöperative, Bellville, Tex., $200,000.

P.R. & W. Electric Coöperative Association, Wamego, Kans., $455,000.

Central Georgia Electric Membership Corporation, Jackson, Ga., $50,000.

Cobb County Rural Electric Membership Corporation, Marietta, Ga., $50,000.

Owen County Rural Electric Coöperative Corporation, Owenton, Ky., $740,000.

Roosevelt Rural Public Power District, Mitchell, Neb., $61,000.

Aiken Electric Coöperative, Aiken, S. C., $25,000.

Head of the Lakes Coöperative Electric Association, Superior, Wis., $165,000.

Ashley-Chicot Electric Cooperative, Hamburg, Ark., $268,000.

Colquitt County Rural Electric Company, Moultrie, Ga., $175,000.

Bartholomew County Rural Electric Membership Corporation, Columbus, Ind., $130,000.

Allamakee-Clayton Electric Coöperative, Postville, Iowa, $315,000.

Nobles Coöperative Electric, Worthington, Minn., $340,000.

North Pine Electric Coöperative, Finlayson, Minn., $300,000.

Natchez Trace Electric Power Association, Houston, Miss., $343,000.

West-Central Electric Coöperative, Higginsville, Mo., $265,000.

McCook Public Power District, McCook, Neb., $485,000.

Tri-County Rural Electric Coöperative, Napoleon, Ohio, $140,000.

Bedford Rural Electric Coöperative, Bedford, Pa., $78,000.

McCulloch County Electric Coöperative, Brady, Tex., $200,000.

Pedernales Electric Coöperative, Johnson City, Tex., $262,000.

Johnson County Electric Coöperative Association, Cleburne, Tex., $175,000.

Karnes Electric Coöperative, Karnes City, Tex., $264,000.

Snapping Shoals Electric Membership Corporation, Covington, Ga., $205,000.

Eastern Illinois Power Coöperative, Paxton, Ill., $610,000.

Thumb Electric Coöperative of Michigan, Ubly, Mich., $575,000.

Capital Electric Power Association, Clinton, Miss., $190,000.

Jasper-Newton Electric Coöperative, Kirbyville, Tex., $285,000.

Serving one of the Nation's Fastest-growing areas

Take for example the city of Lubbock, Texas, where above photo was made. The 1940 population was about 40,000: present estimated population 60,000. Building permits granted in one recent month exceeded one million dollars: were nine million in 1946. Nearly all the fifty cities and towns served by our companies are growing vigorously.

In this relatively young area, where the pioneering spirit still prevails, principal basic sources of revenue are agriculture, livestock, transportation, petroleum and natural gas. But in last decade industrialization has accelerated. There have been established manufacturing plants, meat packing plants, canning plants, alfalfa dehydration plants, sodium sulphate plants and others. Opportunities are open for many more.

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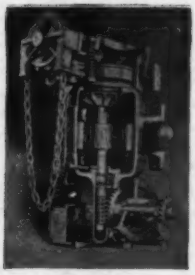

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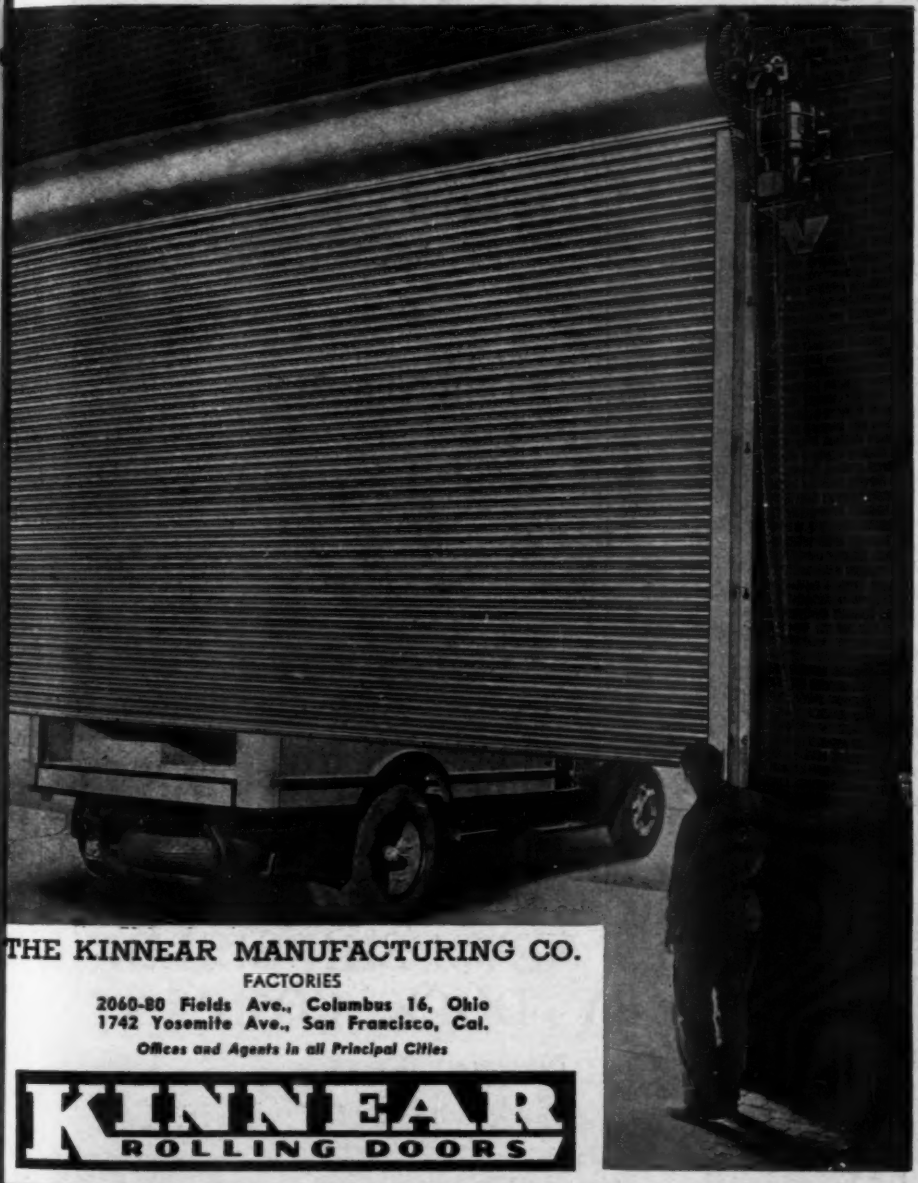

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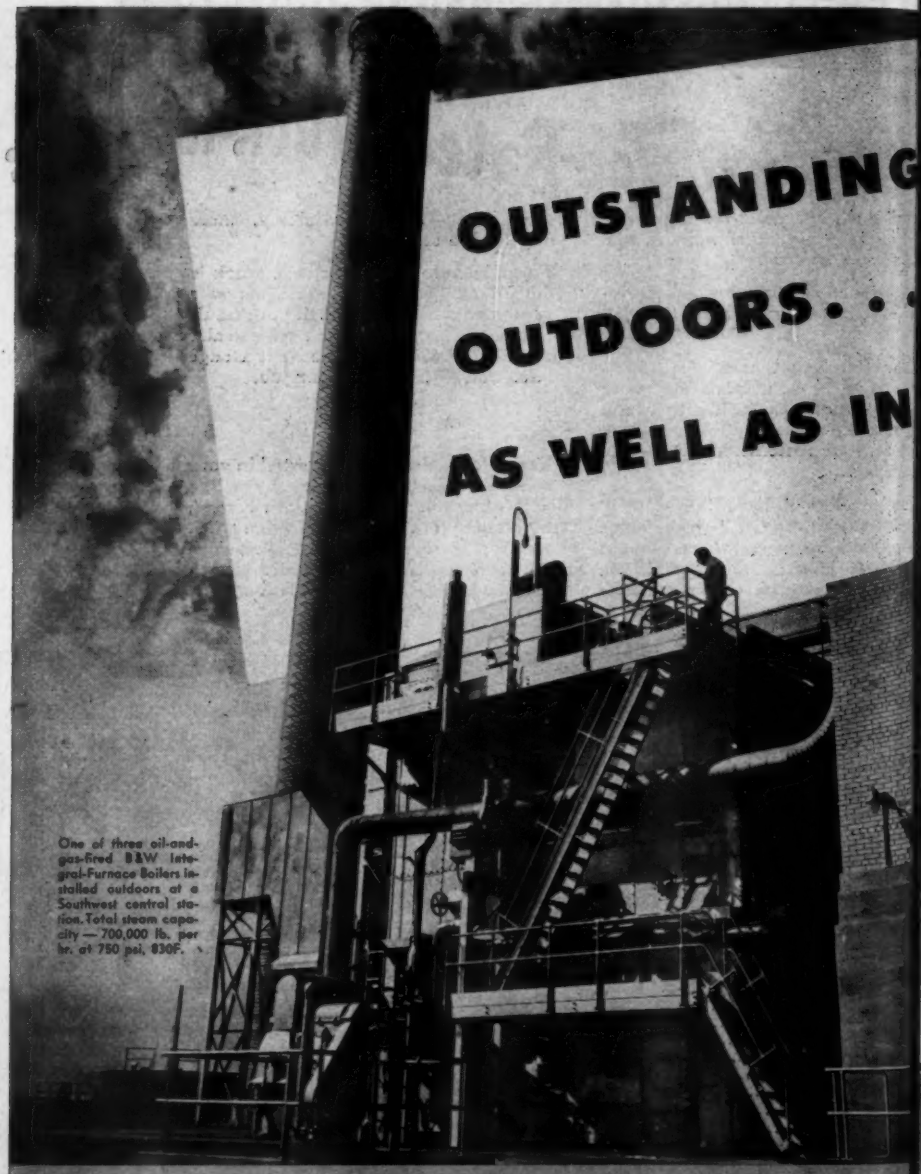

One of three oil-and-gas-fired B&W Integral-Furnace Boilers installed outdoors at a Southwest central station. Total steam capacity — 700,000 lb. per hr. at 750 psi, 830F.

Outdoor and Semi-Outdoor Installations of B&W Boilers:

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By Locations: Arizona, California, Colorado, Florida, Iowa, Kentucky, Louisiana, New Jersey, New Mexico, New York, Oklahoma, Oregon, Pennsylvania, Texas, Utah, Argentina, Columbia, Cuba, Mexico, Netherland West Indies.

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Outdoor and semi-outdoor installations are an old story with B&W Boilers. They have been identified with these types of power plants since their inception over 15 years ago. More than 100 Integral-Furnace, Radiant, and Stirling units with an aggregate steam capacity of 17 million lb. per hr. are now in service or on order. Individual steam capacities range from 25,000 to 500,000 lb. per hr., with pressures up to 1500 psi and temperatures up to 950 F. Fuels include pulverized coal, gas, oil, wood, and industrial refuse.

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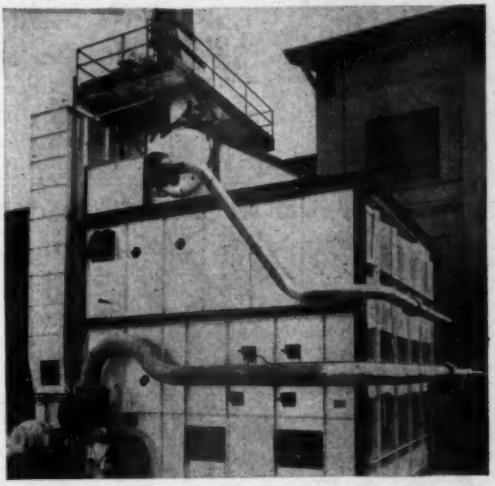
Four 65,000 lb. per hr. B&W Integral-Furnace Boilers installed outdoors at a Utah refinery. They are fired with oil and gas.



One of the earliest outdoor boiler installations in central station service—a B&W Integral-Furnace unit of 75,000 lb. per hr. capacity of 87.5 psi, 825 F; fired with oil and gas.

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